June 1983 Volume 2 $2.00

softalk

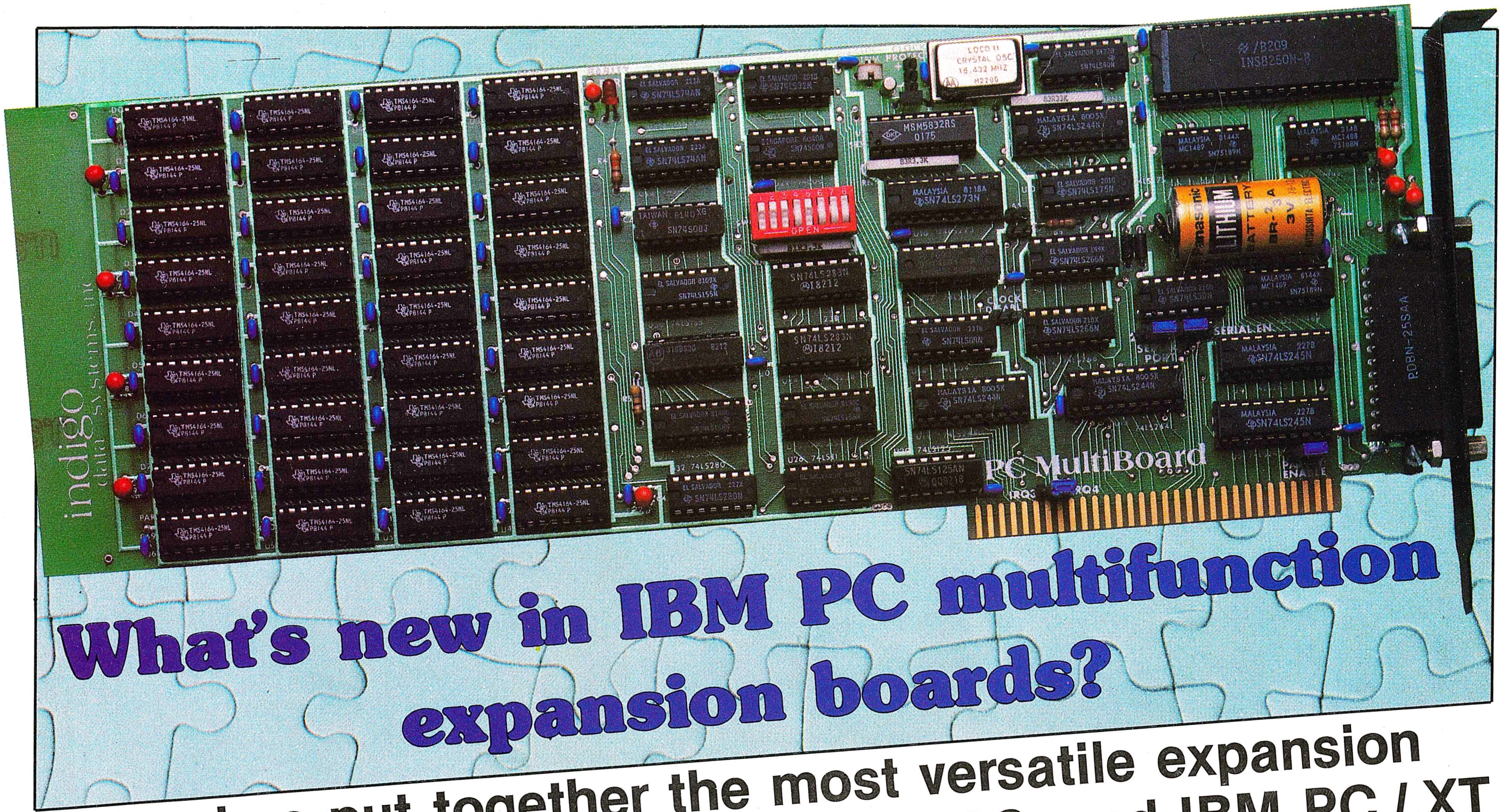
for the IBM Personal Computer

PERSONAL FINANCE REVIEW

A NEW MOUSE-DRIVEN WORD PROCESSOR

EXEC COMPUTERLAND

ALASKAN DEFENSE NETWORK



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softalk
for the IBM Personal Computer

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Moving? Send new address and old to Softalk/IBM Circulation, Box 60, North Hollywood, CA 91603; telephone (213) 980-5074.

june jumble

This month's contest is a find-the-word puzzle for all you word hounds that eat 'em up in *People* magazine. However, it also contains an excruciating second level for all you die-hards, and a third bonus level—if you're not blind by the time you get there.

The first level is for fun. Find and circle the sixty-two words listed. They can be found horizontally, vertically, or diagonally.

The second level is for the green stuff. You can't win the "one hundred dollars' worth of goodies for your pc" unless you complete it, and you can't complete it until you complete level one. If you want to try, go ahead, but don't say we didn't warn you. You'll find the words primarily in the areas you didn't circle in level one, but some letters may overlap level-one words. The words that the clues refer to can be found somewhere in this issue. Company names are advertisers, and that's all we're saying.

To win the prize, send us a complete list of seventeen words, in the best numerical order you can muster, along with your completed puzzle.

The third level is for those of you who want to go the distance. What you must do is find any additional words you can that are not already completely encircled. For example, the word bee is there, as well as the word moot.

Attach this word list to your second-level solutions. Fifty dollars will be given to the longest list. However, you must have the seventeen level-two words correct in order to win the bonus. Words at this level must appear in Webster's Unabridged Dictionary. No foreign words, personal names, slang, or acronyms; whatever *Scrabble* accepts, we'll accept. We casually reserve the right to be ruthless at this level, so no words within words, okay?

Send your lists and finished puzzle to: Puzzled, Softalk IBM, 11160 McCormick Street, Box 60, North Hollywood, CA 91603. In case of a tie, the random number generator will decide. Entries must be received at *Softalk* by June 15, 1983.

Just to make things easier all around, please circle the words in each level with a different color of ink, pencil, or blood, and send photocopies of each level's solution.

1) Game from Idaho.
2) They get mono graphics from a Lotus.
3) They do it on perfection.
4) Floppy magazine.
5) They make it easy.
6) Mr. Utilities.
7) They take telephone orders only.
8) Simplified Software.
9) Personal money manager.
10) They're your innovative guide.
11) Word processor with an *ear*.
12) Top *Calc* star Corp.
13) Sends you through a hoop.
14) Printer in Saint Cloud.
15) Big Blue.
16) ______talk.
17) Number nine is their baby.

```
M D M K K K B O R D E R L G M E D O M A P P L E G
R B E E J C S C N X R M E M P A L A N T I N A T J
O X L L T X A I V P A M L B W G I R S A L R I L P
W I F S I S K R D M W A L S T R I N G D A O T A E
Y R R S T M Y D T O D M A Y L F D G F F C T N T N
Z T C E W A I S C D R D R O C E R E O R S N E I I
Z A Z C T K R T D N A E A F O K $ D G B A E U G T
U M K C S C H L E A H K P S M P B V X A P M Q I U
F T A A X Y A V O R C I M I P F I L E G U B E D O
T U E J N A N R X G P J K N U R T P D P C G S X R
L P R D T I T O A V I X M T T N I N C T A N N J K
C N B G P R F N F H H C I E E D D N E P G T S A F
B I N A R Y A R Y F C H C R R L 9 L T M G X D E L
D V S C Q A P D E S L G R F B E 9 C N O E T T E O
N O Y A H R K N E P S I O A J I C D I R U T R R P
O L W D B R R E F F U B N C F F X X R P C T A H P
T K L N D A L B Y T E J S E R I A L P A C Y F T Y
R M O O T G Y Z R P C W G G N S M A R G O R P O S
O U B C F I 2 3 O B U R H R R I G S N F P B P W S
N T O E O K M D M I Y N P E O V L N S A W R Y T R
R H C S S M Z E E T I S C M T V G N I O R K K E Q
E P G O M S K G M K C C C H C I G G O D R T S N K
T M C N I E R A W T F O S H E B D H M C O C R O N
E O P A S E L U C R E H G A V M M E F H H C R O V
P C P N P D R I V E L O S N O C L A N I M R E T F
```

Access
Array
ASCII
Basic
Binary
Break
Buffer
Byte
Character
Chip
Cobol
Coding
Computer
Console
Data
Debug
Delimiter
Disk
Downtime
Drive
Edit
Field
File
Floppy
Fortran
GIGO
Hardware
Input
Interface
Keyboard
Keypunch
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Mainframe
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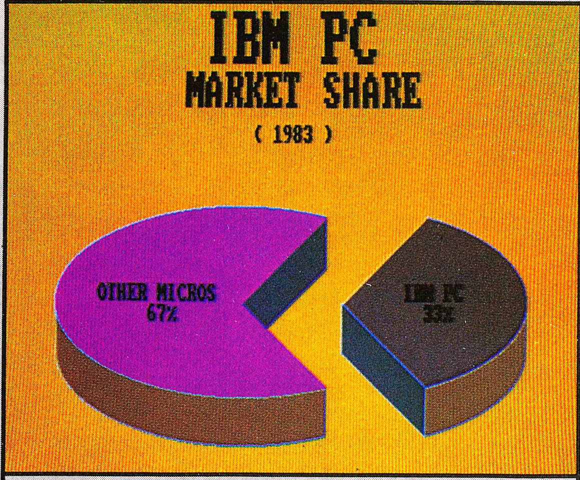

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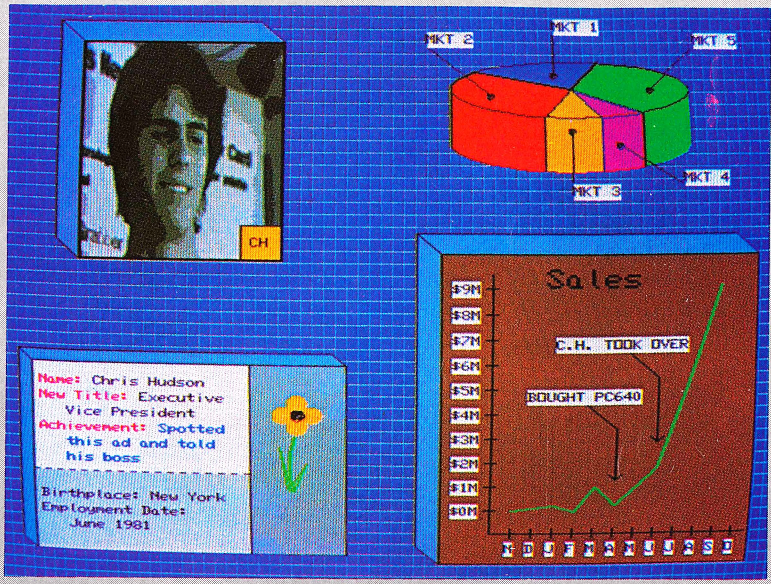

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crosstalk

It All Adds Up

I find your magazine interesting and useful, and I particularly enjoy reading letters from other pc users about their experiences with hardware and software.

Have any readers had any experience trying to hook up a one-half-inch tape drive to the pc? Apparently it is possible to do this with the Apple and thus should be possible on the pc, but I have not been able to find anyone who has actually done it.

I have a NEC 3530 printer, which is similar to the 3550 being sold by IBM as their letter-quality printer. Although I was told by IBM salespeople that the 3530 would not work with the pc, I have had no problems at all. It does everything I want it to, including subscripting, superscripting, overprinting, and, most important to me, printing of mathematical notations. To access the mathematical notation it is necessary to send "shift out" and "shift in" commands to the printer. The biggest problem with this in *WordStar* is that a special patch must be made to the Install package to have the special print characters send the correct command to the printer, but most dealers should be able to help with this, or at least get Micropro to tell them how to do it.

I use the *ProKey* program, from Rosesoft of Seattle, to customize my keyboard so that I can type in Greek notation and mathematical symbols with one or two keystrokes. The use of this program makes things amazingly easy. In fact, *ProKey* is far and away the most useful single program I have. It allows me to recustomize my keyboard for use with each program I am working with, so that a single keystroke will take the place of any commonly used string of keystrokes.

Lee E. Edlefsen, Seattle, WA

You Decide Its Worth

If you are looking for a good database program, I would like to recommend one that is priced to fit anyone's budget. *PC-File* by Jim Button of Bellevue, Washington, is an excellent program that has many possible applications. It is very well done, the author is very responsive to questions and always open to suggestions on how to improve it. One of the things I like is that it is one of several user-supported programs available. This means that if you like it, you are asked to send whatever you feel it is worth to the author. A minimum amount is suggested but not required. You are encouraged to copy it and distribute it to others. To receive your copy, just mail a disk with the disk format you require indicated and a self-addressed, postage-paid mailer to Jim Button, Box 5786, Bellevue, WA 98006.

Or you can send a $35 prepaid order, in which case he will supply the disk, postage, and mailer. Included on the disk is a complete operation manual for the program.

L. W. Summers, Milwaukie, OR

Words from a Star Gazer

I do a great deal of writing, particularly academic writing. I use an IBM pc with two 320K drives, and 320K of memory, which I bought to use as a RAM disk and for print spooling, as well as for editing long documents. I use *WordStar* and a Daisywriter 2000 with a sheet feeder. This system makes writing and rewriting a lot more fun, much faster, and wonderfully convenient. The result is more and better, and I like it a lot. However, I have run into some significant and, it seems to me, unnecessary limitations with the software.

Compared to *WordStar*, *SpellStar* is a big disappointment. I am not bothered by the time it takes to check a document, but I do find that making corrections, once they're flagged, is cumbersome. More serious is the inadequate dictionary, which contains only twenty-one thousand words. Even a modest pocket dictionary is far bigger than that; the unabridged Webster's has over four hundred fifty thousand entries. In checking the spelling of a six-page, single-spaced document, *SpellStar* flagged about eighty words, including "man," "eat," "disgusting," "woman's," "nouns," "plurals," "rewriting," "footnotes," and other common words. Only about five of the words were actually misspelled. *SpellStar* does not recognize words that end with an "apostrophe s", nor does it recognize certain compound words. Adding new words is inconvenient.

The *Random House Proofreader* with eighty thousand words looks very attractive, but I would like an even bigger dictionary. Can anyone tell me where I can buy a word list of three hundred thousand or more words to extend a spell-checker? I don't care how long it takes to run—I can go make a cup of coffee while I'm waiting. I do care about how many correct words are flagged, and how quick it is to add flagged but correct words

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• IBM is a trademark of International Business Machines to the dictionary so they won't be flagged again. Where can I get specialized vocabularies in disk form or accessible for downloading onto disk? I am particularly interested in a social science dictionary.

WordStar itself also lacks other features that are available on some other programs. *The Final Word*, for example, has two windows, useful when moving blocks or merging separate files. It provides for automatic print-time fill-in of correct back references within the document, has formats for the address and closing of letters (and for verse), saves deleted text in case you change your mind, and promises "state save" in the event of a crash or power failure. I wish there was a way of changing the default format on *WordStar*. I shouldn't have to do it all manually for each document, yet the standard defaults don't work with my cut-sheet feeder or the documents I usually want to produce. Is anyone selling a patch for customizing *WordStar* defaults? I am looking forward to *WordStar*'s version 3.4, which is apparently being released now, as well as the footnote, index, and table of contents options that have been announced.

Altogether, writing with my current system is a pleasure and a vast improvement over any typewriter. But it could, and should, be better still. I would like to be able to see boldface, shadow printing, superscripts, subscripts, and underlining on the screen. It should also be possible to customize the display of a word processing program for a given font or character set, so as to display the characters that will actually be printing, including accents, foreign characters, scientific, mathematical, and special symbols. It would be a big help to have more than eighty columns for documents using twelve or fifteen characters per inch, for example, and more than twenty-five lines visible at a time. An entire page, plus menus, status information, file directory, and a window for a second file should all be on the screen.

Alan Page Fiske, Chicago, IL

The manufacturer responds:

Thank you for your suggestions and your endorsement of *WordStar*. Let me answer your points in order.

MicroPro has recognized the inadequacy of the current *SpellStar* dictionary. The next release of *SpellStar* will contain a dictionary containing the twenty thousand most frequently used words in the American language. It is based on the *American Heritage Dictionary*, published by Houghton Mifflin. Since it is based on the most frequently used words, it is equivalent to other dictionaries many times its size. We have found that the new dictionary significantly cuts down on words incorrectly identified as misspelled.

Another way to cut down on incorrectly identified words is to include words that you yourself use a lot in your supplemental dictionary or add them to the main dictionary. In tests in a variety of environments, we have found that after several weeks of adding words, the error rate becomes very low.

The default formats or toggles can easily be changed on *WordStar* by using your system program Debug and patching locations that MicroPro will gladly send you. The next version of *WordStar* will contain a new install program that will allow the user to change the defaults without patching.

WordStar contains a horizontal scrolling feature that allows you to see more than eighty columns. We will soon have a program that allows the user to create indexes and tables of contents.

Many of the other features you suggested are good ones, and we are considering adding some of them. However, our ultimate objective is to market a word processor that is very powerful while being easy to use. We have to carefully evaluate all new features to make sure they add substantially

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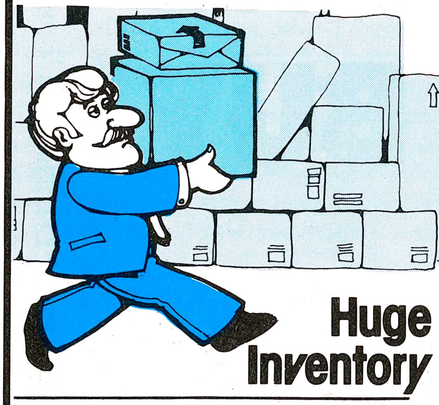

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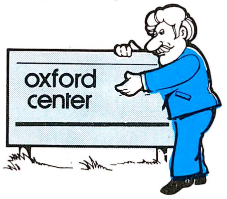

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to the functionality of *WordStar* and don't detract from its ease of use.

Leigh Marriner, product manager,
MicroPro International, San Rafael, CA

PC Calling HP

I would like any information fellow readers can offer on the availability of software to allow the IBM pc to interface with the Hewlett-Packard 3000 Series III, HP Series 44, HP Series 64, and to support the Hewlett-Packard View/3000 subsystem. I would appreciate hearing from anyone who may be able to help through Crosstalk.

Don Leifheit, Chippewa Falls, WI

The Extent of the Difference

I was dismayed at the recent decision of Lifeboat Associates to *not* support CP/M-86. The tragic disproportion between the cost of CP/M-86 and MS-DOS (now corrected) has caused a terrible loss (or at least setback) for the end user. All of what was said in the article in your October '82 issue comparing the two operating systems was true. What was underemphasized, however, was just how much difference there is in the end user's actual use of the different operating systems.

Most of us who manipulate files tend to try to maximize utilization of disk storage space. The more efficient dynamic reallocation of CP/M-86 makes a difference to the user in such situations. In copying files, or even in formatting new disks, it is much more reassuring and *pleasant* to see the verification of the recording done automatically (in CP/M-86) without extra commands. In transferring files from drive to drive, the greatly added versatility of the CP/M-86 PIP program leaves no room for comparison.

But most important of all (and certainly the most noticeable difference) is the real bottom line of *speed of operation*. In directly comparing a relatively simple program in *dBase II*, I found that the MS-DOS version took literally twice as long to run as an identical program in CP/M-86. Further, in comparing an eight-bit Televideo side by side to an IBM pc (using MS-DOS), running identical long programs, the Televideo completed the task in less time than the sixteen-bit IBM. This finding should strike some very fundamental chords in the nervous systems of end users (be they programmers, secretaries, or whatever) as they sit waiting for the disk drives to finish spinning in MS-DOS. Why bother to buy an IBM pc if you're going to run it slower than an eight-bit machine—especially if the latter has more storage per floppy?

Lastly, it is a very easy transition for the person familiar with CP/M to convert to CP/M-86, while the change to MS-DOS is fettered with far more frequent minor irritations. A person who learns first on MS-DOS might never see a need for the greater ability of CP/M-86, although he could certainly relate to the decrease in operating time. A person who learns the CP/M format first will just shake his head in dismay at the minor command differences and major shortcomings of the MS-DOS.

Bruce M. Ascough, Forth Worth, TX

Warranty Wasted in Warehouse

I think the public should know we can be caught in the middle of NEC and IBM. NEC's warranty goes into effect when the company parts with its printers, not when the printers are purchased. I didn't even have my hands on my printer until weeks after the warranty had expired—in an IBM warehouse.

Dominique-Rene de Lerma,
Baltimore, MD

A Not-So-Peachy Situation

I read with interest John O'Shea's article in the April issue concerning a first-time user's problems with Peachtree *General Ledger*. The problems encountered and the responses of "support" personnel are all too typical. In the minicomputer business, we refer to such helpful support people as the "Oh-oh Squad"—they would stand around, viewing problems, and respond helplessly with, "Oh oh."

I had a similar problem with Peachtree *General Ledger* for the IBM pc that I purchased in April 1982. (How many thousands had already been sold?) However, I had the advantage of fifteen years' programming experience with minicomputers. I was unable to add a single account to the chart of accounts because of a Basic error and an abnormal termination of the program. First, I contacted my dealer—"Never heard of that problem." Next, I contacted IBM—"We don't give end-user support." When I became upset, I was promised someone would call me back. One day later I had a call from a PR person from IBM. "If you take the package back to your dealer, we're sure he'll give you your money back," he said. I now knew I was again dealing with the "Oh-oh Squad."

Since the sample data disk seemed to work, I set out to discover how my situation differed. Obviously, it had something to do with the values I had used to set up my system file. I began by using the settings from my sample data disk. One by one, I modified the parameters to correspond to my settings. After changing each value, I would try to add an account. If successful, I would change another parameter. When I changed the "Yearly or Budget Comparison" to "Budget," I could no longer add an account. Armed with this information, my dealer was able to reproduce the problem. Further, he seemed aware of some "patches that had just come in from Chicago."

One week later, patches arrived in the mail. Once installed, I could create a chart of accounts. Numerous other idiosyncrasies still existed and do to this day. As an aside, how many first-time users can install patches? How many purchasers of Peachtree's *General Ledger* gave up in frustration? How many kissed $600 good-bye?

These are, obviously, not isolated incidents. The industry is often so busy touting its virtues that the poor users are drowned out in the hyperbole. Support is, and will continue to be, a major problem for all classes of microcomputer users. It's time the manufacturers, distributors, and dealers became responsive to the poor guy feeding margin dollars up the chain—the end user.

John J. Henderson, president,
Concentric Data Systems,
Westboro, MA

Striking at the Heart of DOS

This is in response to two articles by Alan Boyd about DOS 2.0, "Introducing DOS 2.0" and System Notebook, in the April *Softalk for the IBM pc*. These columns make reference to "overzealous programmers" who by-pass DOS and directly access either IBM's ROM BIOS or other low-level system elements. The claim is made that these programmers are doing a "disservice" to themselves and end users, because the resulting programs are hard to port from machine to machine and do not always work on the same machine with different versions of the DOS.

Perhaps Mr. Boyd is not aware of this, but PC-DOS versions 1.0 and 1.1 have very limited capabilities as far as addressing the screen goes. The DOS functions that exist allow the video screen to be used only in a text mode like a Teletype terminal, and there are no graphics functions provided at all.

This and other shortcomings of DOS make it absolutely imperative for "overzealous programmers," such as myself, to write programs that by-pass DOS if we want to produce programs that are at all useful. Programs such as *VisiCalc* or *PFS:File*, or any program that displays graphics, could not exist on the IBM pc if they had to depend completely on DOS function calls. The usefulness of the entire system would then be incredibly diminished.

I want to make it clear that I'm writing not to complain about DOS, but rather about these columns. Boyd says that our programs lack total compatibility "through no inadequacy of DOS," but this is simply not true. In fact, we have had to by-pass DOS precisely because of its inadequacies, and even when we have gone through DOS its newer versions have sometimes been incompatible with the older versions anyway. So I don't think Boyd should be so quick to ascribe portability or compatibility problems to a "lack of discipline" when, in fact, the heart of the problem is DOS itself.

Jeff Tucker, Mountain View, CA

Angry at Edlin

Recently I was using the Line Editor (Edlin) program provided on the DOS disk when something happened that caused me to become very angry. I was typing a report using the Edlin program, and when I was through I entered E to save my report. The disk drive spun for a moment, and then I got an error message that read, "Disk full—write not completed." I was about to change the disk to try and save the report again when I noticed that the Edlin prompt, the asterisk, was not to the left of the cursor, but the A> prompt was. This meant I was no longer in the Edlin program, and I lost 103 lines of text with no way to restore them except by retyping them over. I suggest that those using Edlin make sure they have plenty of disk space before starting to enter their data.

Darren Lasko, Pittsburgh, PA

Purpose Undefeated

Can anyone explain that statement in the IBM Basic manual, which says that because Basic and DOS block as many records as possible in 512-byte sectors, the *put* statement does not necessarily perform a physical write to the disk? I interpret this to mean that the file may not actually be stored on the disk, thus defeating the purpose of creating a file.

F. Reichel, Woodside, CA

What the manual is trying to say is that DOS and Basic buffer *data in memory before writing it to disk; only when the buffer is full will a physical disk write take place. This buffering is transparent to your application program. For example, if the first* put *statement in your program wrote 128 bytes to disk, DOS would accept the data but, instead of writing it to disk, would simply transfer it to the buffer. If you then executed three more* put *statements, each one writing another 128 bytes, the 512-byte buffer would be filled, causing DOS to write the entire buffer to disk. The advantage is obvious—four* put *statements in your program, each with its attendant delay caused by the slow mechanical disk drive, become one actual disk write. Since 512 bytes can be written almost as fast as one byte when writing small amounts of data (if not just as fast), this buffering scheme saves a lot of time. As a matter of fact, it means a program written with lots of character I/O can run just as fast as a program that uses fewer I/O statements, each one writing more data. When you close a file, any data*

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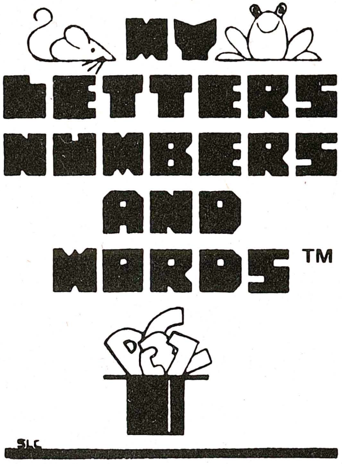
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still remaining in the buffer—even if it is less than 512 bytes—will be written to the disk; this bit of good housekeeping is called flushing the buffer.

Incidentally, you can alter the size of the 512-byte buffer with the /?? option on the Basic command line. Since 512 bytes is the size of one physical disk sector, buffer sizes of 512 bytes, or multiples of 512, will be the most efficient. —*Ed.*

Untying the Little Man's Hands

I've had my pc only since September '82, so I am still fairly new to the world of microcomputers. I find your magazine to be invaluable in explaining both the hardware and software for the pc. Alan Boyd's column is tremendously informative, and so are the articles written by Craig Stinson and Peter Norton. However, Peter Norton made a statement in his review of the IBM pc XT (April '83) that causes me a great deal of concern. He wrote, "Nevertheless, the handwriting is on the wall for the 64K systems; it's the same old story—move forward or be left behind." Does this mean that the pc is going to cater strictly to large users?

I do not own a business, nor am I a businessman. I bought my pc strictly for my home use. I chose the pc because I am not the type of person who'd be satisfied with a lesser computer. I would hope that it does not get to the point where the pc and the software for it are strictly for the large business systems owned by people with more dollars than sense! That would be a terrible disservice to the small users. Or don't the little people count?

Speaking of prices, I write most of my own software because the majority of the commercial software is so ridiculously priced! For example, there is a company selling a program that makes neatly printed labels for disks. The files are listed in alphabetical order and all the user does is insert the disk. Don't get me wrong. I think this is a great idea. I, too, like neatness and uniformity, but I am not going to pay $59.95 for it! I wrote my own program for this application in just two hours. My program allows the use of either 3 1/2 × 15/16-inch or 5 × 15/16-inch labels and even advises the user on what size of labels to put into the printer according to the number of files on the disk. Haven't the software companies ever heard of volume sales through lower prices? I do, from time to time, buy some of the more reasonably priced software available, such as that marketed by FriendlySoft.

I am also looking for a good reference for memory locations that tells which bits/bytes control which function. IBM Basic has *peek* and *poke* commands, but none of the literature that I have found discusses in depth where they are used and how to use them effectively. Could any readers possibly steer me in the right direction? It took me several months and a lot of luck to figure out how to force a Caps Lock from within a program with a poke. The documentation on other micros lists several pages of choice bits and bytes. Why is it such a big secret with the pc? I am certain that programming flexibility can be increased with a few judicious pokes. I, for one, am tired of programming with one hand tied behind my back. I wonder, do any other readers share my views?

Charles L. Campbell,
Vandenberg AFB, CA

A Basic Education

To E. B. Clark: You want to learn file manipulations (sequential and random)? We suggest our educational program *Edubas II*. It unlocks the advanced functions of the Basic language of the IBM pc—string and file manipulations, graphics, and so on. If you are not an expert in Basic programming, then start learning with *Edubas I*. Give us a call at (707) 763-9700 or write to Europro, 129 Saratoga, Petaluma, CA 94952.

Michel Degive, president, Europro,
Petaluma, CA

I'd like to respond to the letter from E. B. Clark on the subject of creating and accessing random and sequential files. I had no background in working with disk files and was faced with the same problem. Fortunately, I have found two books that covered the material clearly and completely. Although they were not written expressly for the IBM pc, the versions of Basic that are used work on the pc with little or no modification. Additional commands available on the pc can further simplify the programs.

The first book I recommend is *Data File Programming in Basic* by LeRoy Finkel and Jerald R. Brown, published by John Wiley & Sons. This is a self-teaching guide and by using it I have been able to learn the fundamentals of disk files. The program listings are accurate, understandable, and beneficial. The examples and self-tests (with answers) drive home the authors' points.

Microcomputer Disk Techniques by Paul Swanson, published by Byte/McGraw-Hill, is a more advanced book that begins to explore the methods of accessing files. It is useful as an introduction to some of the algorithms for search procedures. These two books have been a great help to me; I offer them as a suggested course of study in disk file techniques for nonprofessional programmers wanting to learn to use their systems effectively.

Kevin L. Hill, Fort Wayne, IN

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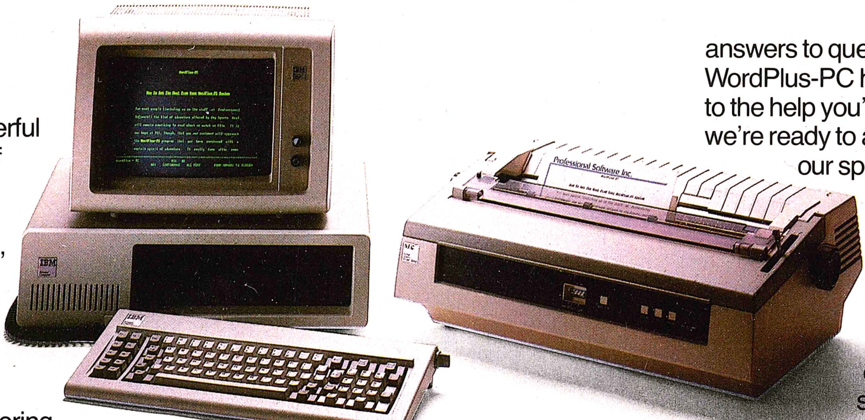

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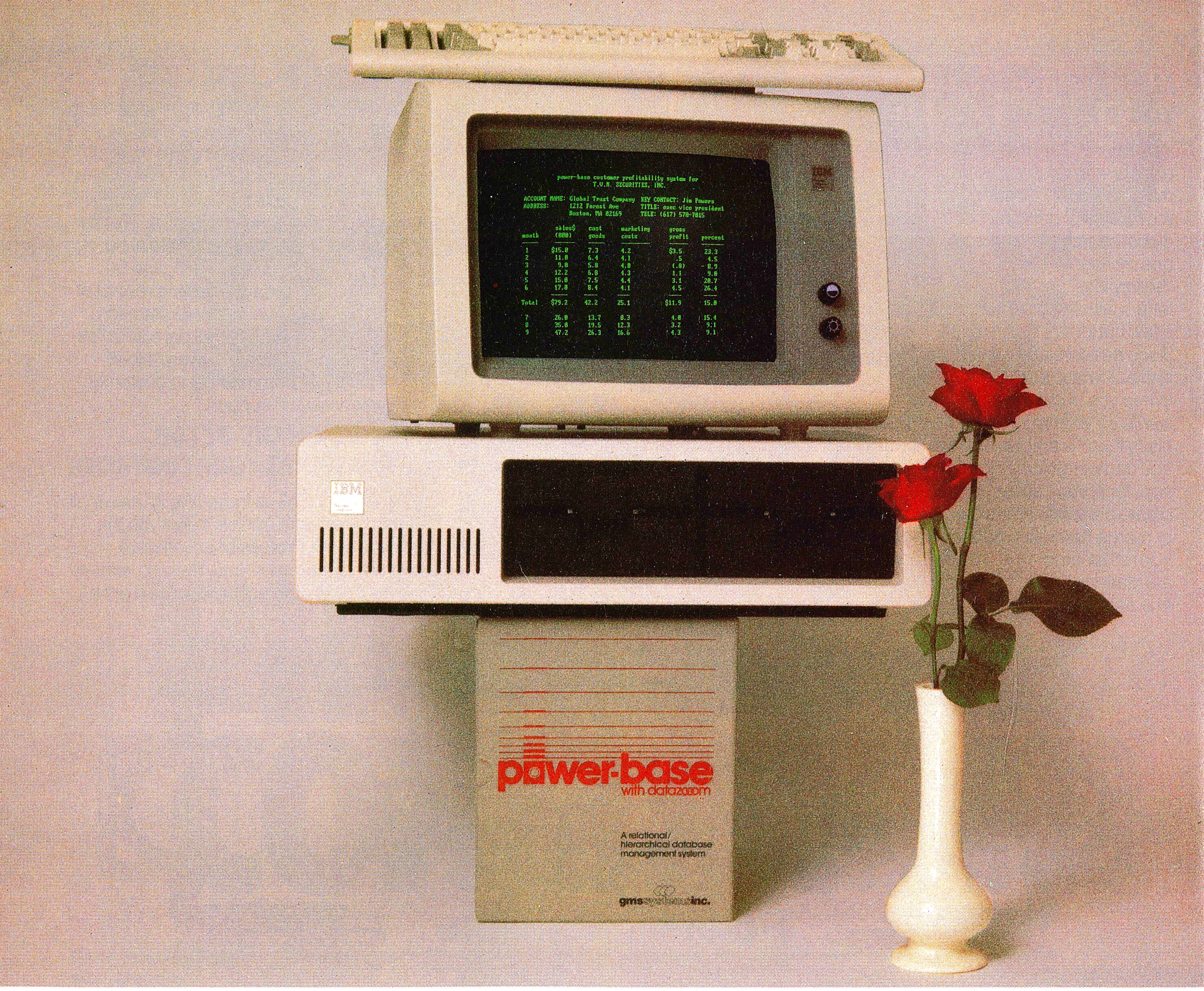

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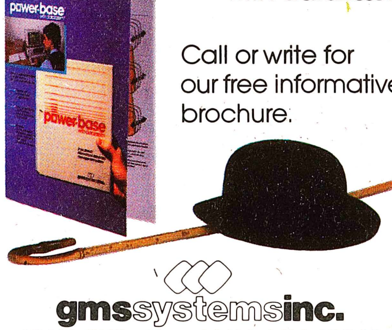

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tal PC User Group (now twelve hundred fifty members strong) have taken on the task of testing any Cobol compiler available. Four compilers have been committed; others have been requested. For testing, the Gibson mix is available and a locally written program has been prepared.

We would like to hear from any micro Cobol user who has any comments to make related to this testing. If code is available that could be added to our program, we would especially appreciate hearing from you. Other comments, pro or con, on micro Cobol would be appreciated. Write to COBSIG, Box 2400, West Springfield, VA 22152.

Dave Tallis, West Springfield, VA

Offense Taken

In the April Newspeak column, some writer referred to the band Styx's "beer-and-broads technorock"—whatever *that* means. I don't know about you, but to me, "broads" is a slur word. It pointlessly marred an otherwise interesting paragraph about popular music, and gave the impression that the editors are less than competent. In the future, perhaps the phraseology chosen can be oriented in a less boorish direction. At least I hope so.

Suzanne Fay, Tallahassee, FL

Tool or Toy?

I would like to take exception to a statement in the Exec FriendlySoft written by Forrest Johnson in the January '83 issue. That statement I am referring to deals with the idea of the "boss is coming key." This is just the type of statement computer people do not need to put forth. I consider the IBM pc as a tool to be used within the business community as a problem solver. It is definitely not in the category of the Commodore or Atari game computers. With ever-tightened budgets, it is difficult enough to convince management of the need for the personal computers. Management's first impression is that it is a toy. I, for one, am boycotting any products developed by FriendlySoft because of the company's attitude toward the personal computer.

John L. Cotter, Madison, WI

Honk, Honk

I would like to comment on the letter in the December issue from Peter Norton. I experienced the same problem with my new Epson MX-80, plus some others. Besides the paper-feed problem, I also experienced substandard print quality and dropped characters when trying to use Prtsc. The last character of each prompt line was dropped. After many wasted hours I called Epson and asked about the dropped characters. The company said it was aware of the problem but had no plans to do anything about it. This letter was not typed by an Epson. Therein lies my solution. A new printer costing as much as the Epson should not need wax paper to make it work. Computer peripheral manufacturers are beginning to sound like Detroit—keep bringing it back till we finally fix it or you give up.

Philipp Hartmann, Springfield, VA

Tie and Transfer

In the March 1983 Questions & Answers column, Robert A. Wolfe asked about the possibility of transferring files between the IBM pc and other microcomputers. I'd like to inform readers that TRAX also markets a product called *TieLine* to transfer files between the Apple II and the IBM pc without RS-232 ports or serial hardware on either machine.

Leonard Fischer, Los Angeles, CA

Forthcoming Color

I want to run various programs on my color monitor, but I don't know how to control the screen colors, except in Basic or *WordStar*. If I set the colors in Basic and then revert to DOS for another program, the colors revert to white on black, which is rather hard to read because the color/graphics board outputs characters with only eight lines, instead of fourteen as on the monochrome

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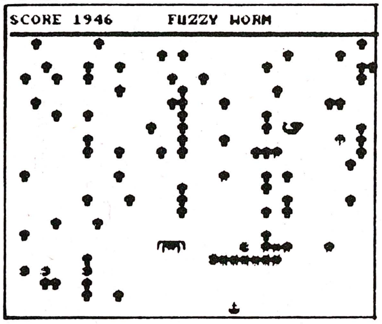

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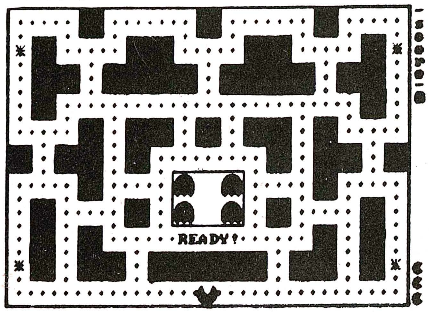

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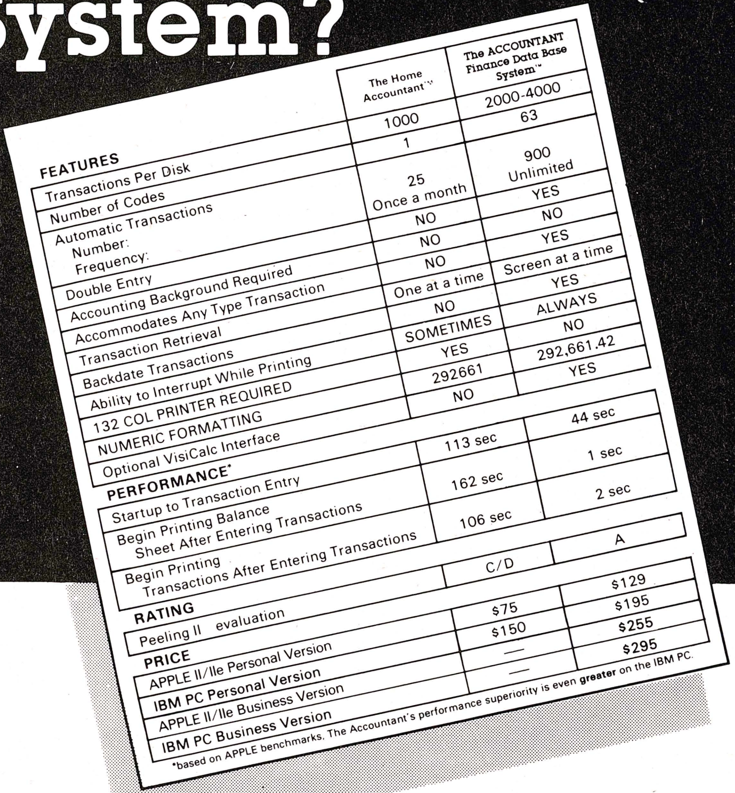

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adapter. Displaying red or blue on white on the screen is more legible. I tried to work this out from the *Technical Reference Manual*, but I can't figure out where to poke the necessary control codes.

Richard E. Ozaroff, New York, NY

See the article, "A Palette for Your Prose," by George Bohannon, beginning on page 133 of this issue. ▲

CONTEST WINNERS

Grrrrrrrrrrrrrrrrrrroan!

That's the sound of the contest judging board groaning at the March limerick contest entries. They were baaaaaaaaaad, people—real groaners.

How bad *were* they, Contestmeister?

They were *so* bad, we couldn't even find ten good ones. So we're only going to put five up for the final vote. The authors will receive twenty dollars for their wit instead of ten as planned. We're not cheap, but we do have standards.

To pick the big hundred-dollar winner, scratch the number of your fave rhyme here on a post card and zip it off to Hung Jury, Softalk IBM, Box 60, North Hollywood, CA 91603, before July 15. Post cards only please; our walls are bare.

(1) An amorous young pc user
Fell in love with a data*Base II*ser.
His relational fate,
Hinged on Ashton and Tate,
If he tried VisiFile, he would lose 'er.

(2) Dexon's wife, a brave mother of ten,
Felt sure she was pregnant again.
But Doc brought great cheer,
"You're loaded with beer!
You *see, Dex*, she'll deblimp and look thin."

(3) My rat Sybil was born with a veil,
Sacked and tied and then shipped off to Yale.
Sybil didn't quibble,
But started to nibble.
So beware! Don't w*rap a rat* for the mail!

(4) An artist who lived in a flat,
Wanted desperately to t*rap a rat.*
Inclined to think smart,
He made it an art,
By painting cheese on the mouth of his cat.

(5) There was a young lady quite bare,
Who was missing some bits here and there.
With sixty-four K,
She went on display,
But what did Miss Lida *Rose wear*? ▲

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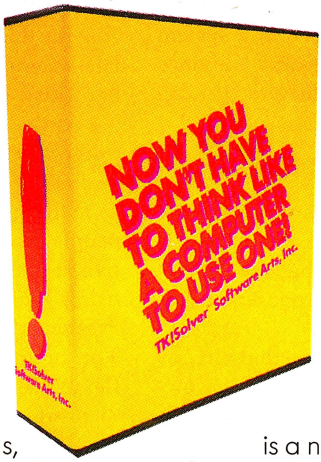
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QUESTIONS & ANSWERS

by Nancy Andrews

Q: I was very interested in the scrolling program in your February column. What I need, though, is a program that lets me look at one screen at a time. I'd like to type *list*, for example, get twenty-five lines on the screen, and then have the listing pause so I can read it. Then I would like to hit another key and get the next twenty-five lines.

Is that what your scrolling program does? If not, is it possible to write a program like the one I described?

Michael Trombetta

A: John Socha's program Scrollk.com, which is presented in "The Scroll Lock Mystery Solved" (*Softalk*, May 1983), does exactly what you describe. The article provides a short Basic listing that pokes in the machine code to create Scrollk.com.

Another solution to the problem is to use the filter called *more* which is available under DOS 2.0. *More* can be used with a process known as piping, wherein the output of one program is transparently redirected to the input of another program. To use *more* with a file called Page, for example, type:

```
TYPE PAGE ¦ MORE
```

The symbol ¦ tells DOS to redirect output from the display to the input of *more*. *More* displays a screenful of information at a time, and then prompts you to hit a key for the next screen. The ¦ symbol is the shifted key to the left of the Z-key—the one that's in the wrong place.

Q: One sentence in Alan Boyd's column in the March issue really caught my eye. I hope there is something in the IBM manuals I have missed. He said, "Press the tab key in a situation where tab stops have not been otherwise explicitly defined; the pc provides default tab stops every eight character positions."

How do you explicitly define tab stops at other than every eight character positions? I am in the process of converting a very large application (more than 75,000 lines of Basic code) from a system that assumed tabs every ten spaces. I would much rather convince my pc that tabs are set every ten spaces. Any information you can provide would be greatly appreciated.

Al Weiss

A: Presumably what Boyd was saying with the phrase "not otherwise explicitly defined" was not that tab stops were conveniently definable in DOS or Basic, but rather that this is what the tab key will do (in DOS) unless an application program such as *Multiplan* or *WordStar* has changed its function.

There isn't any command—in either DOS or Basic—that directly changes the function of the tab key. There are indirect ways, however. If you're proficient in assembly language, you should be able to modify the interrupt vector that handles keyboard input to point to a routine of your own (see "Snooping in ROM: The Software Interrupt," by Peter Norton, in the February issue, or "A Palette for Your Prose" by George Bohannon, on page 133 of the present issue). This approach should be able to solve the problem in both DOS and Basic.

If you don't want to mess with machine language, you can put the following statement

```
DEF FNT = (INT (POS(0)/10) + 1) * 10 + 1
```

into your program, and then use an editor or word processor to find those commas in your program that indicate tab stops and replace them with *tab (fnt)*. The following code demonstrates the function—and also shows, incidentally, that Basic's default tab stops are every fourteen character positions, not every eight:

```
10  CLS
20  DEF FNT = (INT (POS(0)/10) + 1) * 10 + 1
30  A$="0123456789"
40  GOSUB 90
50  PRINT "A","B","C","D","E","F"
60  GOSUB 90
70  PRINT "A"TAB(FNT)"B"TAB(FNT)"C"TAB(FNT)
    "D"TAB(FNT)"E"TAB(FNT)"F"TAB(FNT)"G"
80  END
90  PRINT A$;A$;A$;A$;A$;A$;A$;"0":RETURN
```

Q: I will be purchasing mass storage equipment for my computer as soon as I know what to purchase. My need at this point is a program that will permit me to enter thousands of pages of text and then, as needed, to search that text for occurrences of a given word or phrase.

In more detail, here is my situation. I have approximately twelve hundred sermons, averaging thirty pages of text each. I eventually want to put all these in storage. I realize I will need approximately 100 megabytes of storage. Each sermon will be named and dated. I would like to be able to put them into the computer in random order, but be able to retrieve them chronologically. After some (or all) of the sermons are in storage, I want to be able to search all or a designated portion of the sermons for every occurrence of a certain word or phrase. When an occurrence of that word or phrase is located, I want to be able to view the context of that word or phrase (with scrolling capability) and then either make a printout of a chosen portion of the text or advance to the next occurrence. I would also want to be able to call up any given sermon by name and preview it, again with the print option.

A: What you are trying to do is possible, but it will certainly be expensive and it may be difficult to implement. You could use two forty-megabyte hard disks and load your machine with the maximum allowable amount of RAM (IBM says that's 640K). You could then get some software (many programs are available for this) that would make a sizable portion of your RAM emulate a floppy disk. Then you could load a page at a time from your hard disk into your RAM disk to make the searches go faster.

At the moment we know of no commercially available database program capable of addressing the amount of hard disk storage you're talking about. You might need to write your own or have something custom-written. On the other hand, we have heard of people creating enormous hard-disk files in *WordStar* (see "Detective Story," by Michael Ferris, in *Softalk*, November 1982) and then using *WordStar*'s search functions to treat these files as databases. Presumably other word processors as well could function this way. The program would need three important attributes: strong and flexible search capability, block functions (the abilities, for example, to print only selected portions of a file and to append one file to another), and the ability to create files as large as the available disk space.

A simpler solution that would take less memory and that wouldn't absolutely require massive disk storage would be to use any of a number of commercial database programs to store only limited information about each sermon—such things as name, scripture verses, key phrases, significant words, dates of delivery, and so on. This database could be ordered in a variety of ways and searched fairly quickly; the database would then be used as an index to the actual text of the sermons, which you would have stored elsewhere. If you took this approach and you wanted to minimize your expense (even at today's reduced prices, eighty to a hundred megabytes of hard disk is going to set you back some), you could store your sermons on numbered floppy disks. At the current rate of 360K per floppy (DOS 2.0), you could probably keep five or six thirty-page sermons on each disk.

One final possibility to consider: could your church find use for a minicomputer?

Q: I am an engineering student and have been writing programs in Basic on the pc. I have run into a problem that I've been unable to solve. It deals with single-precision values. For example, if I add 60 and 52.2, the result is 112.2. However, if I subtract 52.2 from 60, my result is 7.799999. To complicate things

to produce answers to two decimal places, use the following:

```
10  X = 17.8792
20  Y = INT(100*X)
30  Z = Y/100
40  PRINT Z
```

To change the number of decimals, simply change the multiplication and division factors. That is, for three places, multiply X by 1000 and divide Y by 1000—and so on.

IBM Basic has an even simpler way to round numbers, using the command *cint*. To illustrate the difference between the related commands *int*, *fix*, and *cint*, note the following table:

X	INT (X)	FIX (X)	CINT (X)
45.67	45	45	46
−2.89	−3	−2	−3

described above—that is, multiplying and without error on the Atari 400, the Apple II VP, and the Commodore 9000. These same r, sometimes fail in all three versions of e, disk, and advanced. Check out the fol- ich converts Fahrenheit degrees to Celsius):

```
","C","Truncated","Rounded"
 TO 212
-32))/9
)*100)/100
(D*100)/100
),C,R
```

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fairly quickly; the database would then be used as an index to the actual text of the sermons, which you would have stored elsewhere. If you took this approach and you wanted to minimize your expense (even at today's reduced prices, eighty to a hundred megabytes of hard disk is going to set you back some), you could store your sermons on numbered floppy disks. At the current rate of 360K per floppy (DOS 2.0), you could probably keep five or six thirty-page sermons on each disk.

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R. Scott Goehri

A: Not exactly—it's a bug in Basic. IBM Basic is known to produce an undue number of round-off errors.

The following letter, from David C. Hohnadel of the Acorn IBM PC User Group in Cincinnati, Ohio, is illuminating:

> I write many small scientific programs in Basic that perform simple calculations. Many of these programs need to have the output rounded or truncated to a couple of decimal places. The final answer is then either sent to the screen or the printer.
>
> I use a couple of common programming techniques to truncate numbers to a fixed number of decimal places. For example, to produce answers to two decimal places, use the following:
>
> ```
> 10  X = 17.8792
> 20  Y = INT(100*X)
> 30  Z = Y/100
> 40  PRINT Z
> ```
>
> To change the number of decimals, simply change the multiplication and division factors. That is, for three places, multiply X by 1000 and divide Y by 1000—and so on.
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> IBM Basic has an even simpler way to round numbers, using the command *cint*. To illustrate the difference between the related commands *int*, *fix*, and *cint*, note the following table:
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> | X | INT (X) | FIX (X) | CINT (X) |
> |---|---|---|---|
> | 45.67 | 45 | 45 | 46 |
> | −2.89 | −3 | −2 | −3 |
>
> The techniques described above—that is, multiplying and then dividing—work without error on the Atari 400, the Apple II Plus, the Wang 2200VP, and the Commodore 9000. These same techniques, however, sometimes fail in all three versions of IBM's Basic—cassette, disk, and advanced. Check out the following program (which converts Fahrenheit degrees to Celsius):
>
> ```
> 10  LPRINT "F","C","Truncated","Rounded"
> 20  FOR F = 0 TO 212
> 30  D = (5*(F−32))/9
> 40  C = INT (D*100)/100
> 50  R = CINT (D*100)/100
> 60  LPRINT F,D,C,R
> 70  NEXT F
> ```

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Certain values of F in this program cause an output in degrees Celsius to be expressed out to five decimal places instead of two. The problem is with the multiply and divide steps, as *cint* and *int* seem to work properly.

IBM has been contacted but answers that "nothing is wrong with Basic; it has to do with how certain numbers are stored internally." I disagree! It seems to me that since all the other microcomputers work properly with these programs, it is more likely that there is some problem with the way IBM Basic handles an internal carry bit when it does a divide or multiply operation.

The problem can be avoided or corrected by using *lprint using* or *print using* to format the output to two (or whatever is required) decimal places.

Q: I have three questions:

I am considering starting a computer club for children (age eight and up) who have access to an IBM pc. Does anyone have information on how to do this?

Does anyone know of a program for the game *go (igo)* for use on the IBM pc?

Does anyone know when and where the Logo language will be available on the pc?

Seymour Manello

A: We don't know of any user groups specifically for children, but take a look at the directory of user groups pubished in last month's *Softalk*. Someone in one of those groups may be able to help.

Nor do we know of any versions of *go* for the pc. If readers are aware of any, please tell us, so we can pass the information on.

As for Logo, we know of two: Harvard Associates (260 Beacon Street, Somerville, MA 02143; 617-492-0660) has just announced a product called *PC Logo*. And Digital Research (Box 579, Pacific Grove, CA 93950; 408-649-3896) is expected to release a Logo early this month. For more information on Logo, you might want to contact the Young People's Logo Association, 1208 Hillsdale Drive, Richardson, TX 75081.

Q: I am interested in using my pc to learn higher mathematics—that is, about basic college algebra. I know that there are a number of programs that have been done for the Apple II. Could you give me information on such programs for the pc—in trigonometry, analytic geometry, calculus, differential equations, statistics, and topology? I would appreciate any help you can give.

Robert C. McLane, M.D.

A: Educational software is just beginning to appear for the pc, and, unfortunately, we were unable to discover any in the areas you mentioned. However, a group at the University of Iowa, called Conduit, has such programs available for other machines and is considering converting their work to run on the pc. Their phone number is (319) 353-5789.

Readers who know of quality educational software in higher mathematics are invited to respond.

Q: I have an Epson MX-80 printer and use *WordStar*. I heard about a patch for *WordStar* that would enable one to use condensed and wide print, superscripts and subscripts, and double strike. Do you know about this patch?

Sue Savonne

A: Yes and no. You can patch *WordStar* to make it print in condensed and double-width modes. Double strike is available without a patch; use control-PD before and after the area you want to print in double strike. Superscripts and subscripts are also available in the program (control-PT for super, control-PV for sub), but the MX-80 won't respond to them. That's a limitation of the printer, not of the program.

You didn't mention which version of *WordStar* you're using, so we'll provide condensed and double-width patches for versions 3.02 and 3.20. Whichever version you're using, start by copying your *WordStar* disk and then copying the file Debug.com from your DOS disk to your new *WordStar* disk. Then type ***debug ws.com***. You'll get a hyphen prompt from Debug.

If you're patching *WordStar* version 3.02, enter the following codes exactly (don't type the dashes; they're from Debug):

```
-E 757 2 12 14
-E 75C 1 E
-E 766 1 F
-W
-Q
```

If you've got version 3.20 of *WordStar*, your patch is as follows:

```
-E 77F 1 F
-E 784 1 E
-E 78E 2 12 4
-W
-Q
```

The 3.02 patch uses control-PR for condensed print, control-PW for wide print, and control-PW to return to normal print from either condensed or wide. The 3.20 patch assigns control-PQ to condensed mode, control-PW to wide mode, and control-PR to return to normal. ▲

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ComputerLand

Ed Faber, president of ComputerLand Corporation, does not have a computer on his desk. Nor is there one in sight in his office. Why?

"Do you type?" he asks. "I don't."

Faber heads a growing multinational network of more than four hundred twenty stores that account for nearly 25 percent of United States retail computer sales. The company signs off its ads with the slogan, "We know small computers." From Faber's vantage point, the keyboard is slowing down computer acceptance.

"To have a real computer explosion," he says, "to the point where we have one or more personal computers per household, some changes will have to happen. The units will have to be much easier to use and more productive in the home. An obvious change is the reduction and eventual elimination of the keyboard as principal input device."

What's the problem with the keyboard?

"To a large percentage of our population, it's a barrier. More people don't type than do. Plus, it's a discipline to enter all the things through the keys; it's very slow."

As for what might eventually replace the keyboard, Faber says, "I see developments similar to what Apple has done with Lisa. Eventually we'll have voice-synthesizing units that will allow for a wide range of voice acceptance. We'll have vocabulary stored in the machines that will allow very flexible, broad usage of the units. We know how to do it. The technology is there; it's just not easy enough to use. And not economical enough."

As chief executive of the world's largest retail computer organization, Faber devotes a lot of energy to encouraging developments that favor broader acceptance of computers.

"I keep doing interviews and talking to people," he says. "I have

A RETAILER'S PERSPECTIVE

by Dennis Briskin

been doing more traveling lately than I normally do, because I don't know how to say 'No.' Whenever requests come in, I like to honor them. That's part of keeping abreast, by the way."

Big Blue Beginnings. At age 50, Faber has spent more than half his life in the computer industry. After getting a bachelor of science degree in industrial and labor relations at Cornell University in 1955, and after serving two years in the Marine Corps, he spent twelve years in sales and marketing at IBM. Then, in 1969, he left Big Blue and spent three years each at Memorex and Four-Phase Systems, establishing marketing organizations in the United States for both firms.

By 1975, Faber was working to set up an American sales force for Omron Tataheshi Electronics Company of Japan, when along came small computers for the hobbyist. Among Omron's customers was one IMS Associates, producer of the legendary Imsai 8080 microcomputer. Mail-order Imsai kits advertised through *Popular Electronics* were the forerunners of today's personal computers.

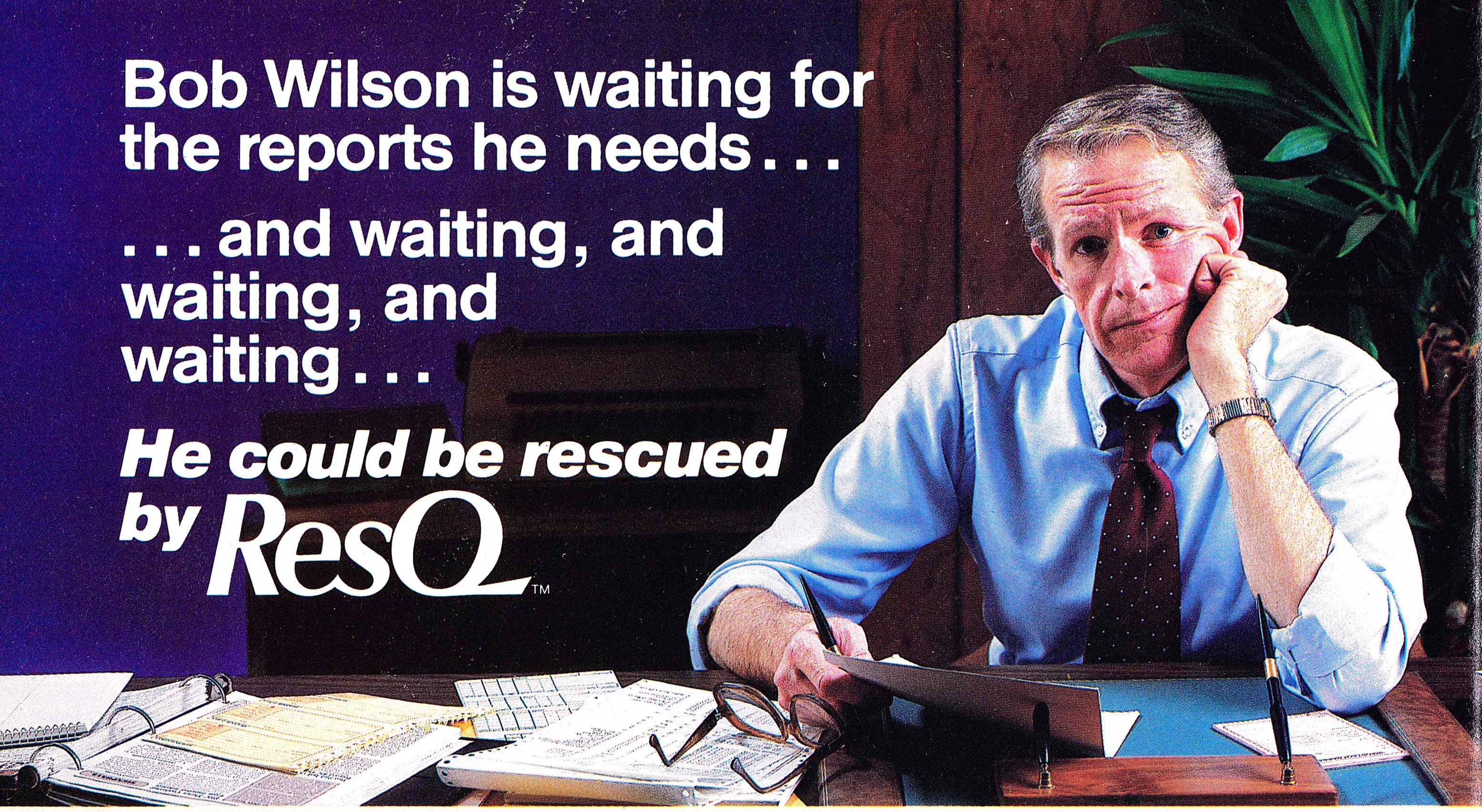
Late in 1975, Omron's president, William Millard, hired Faber to set up the IMS mail-order marketing group.

"The area was entirely new to me," Faber says of that approach to selling computers. "It was mind-boggling to think that people would read a little ad in a magazine and send checks through the mail for a box of pieces which, when properly assembled, turned out to be a computer. It was brand new and very exciting.

Ed Faber, left, as chief executive officer for ComputerLand Corporation, oversees a chain of more than four hundred retail franchises. Ed Murphy, above, supervises software purchasing for the corporation.

"I didn't know it would evolve into the market that exists today. I had doubts about whether it made any sense at all. But in a short time we found we were selling computers at a fantastic rate."

Faber and Millard also found buyers among a new, eager breed of customer: the computer retailer, who bought the kits at quantity discounts, assembled the computers, and sold them in storefronts. They also discovered they were wholesaling to dealers who, by all accepted business rules, shouldn't have been able to survive in business.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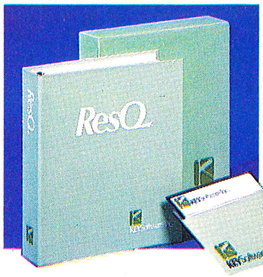

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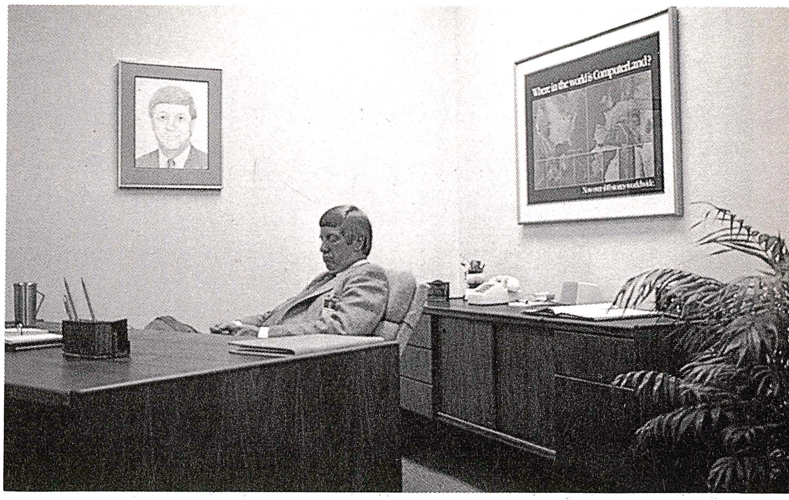

Faber sits alone in his Hayward, California, office.

"Most of the owners—and there were two hundred thirty-five stores by late 1976—were themselves technicians or hobbyists," Faber recalls. "They usually had limited capital and no business experience. These are fairly good indicators of potential failure. Yet they continued to come in, open stores, and not fail. The market was just so large that it was supporting even these very undercapitalized ventures.

"We asked ourselves what would happen if someone came along and did it right—with a package of services to support stores where they lacked experience. This is the franchise approach."

In September 1976, Millard founded ComputerLand, with Faber as president. Faber has spent nearly seven years overseeing the explosive growth of the ComputerLand network. He describes Millard, still chairman of the board at ComputerLand, as "interested in everything we do" but not involved in running the company.

"We opened our first store in February 1977," Faber continues proudly. "We opened store number 400 January 28, 1983. There are nearly 420 now [mid-April]. It's an international company. We're in every state and twenty-six countries. Eighty-four of our four hundred twenty stores are outside the United States. We are opening ten to twelve per month now; that will go up to twenty per month in the second half of 1983."

The success and booming growth of ComputerLand notwithstanding, Faber scoffs at talk of his privately held company going public.

"What for?" he asks.

For one thing, people who run companies that go public sometimes become quite wealthy after the sale of their stock.

"There's Wealth and Wealth." "We don't need that," he replies. "There's wealth and wealth. There are only two reasons to go public. That's one of them. The other is to raise capital. We don't need that, either, although we have plenty of places to spend it, building a network at the rate we are."

Does Faber have a goal for ComputerLand? Where is it headed?

"We have corporate goals, but we don't publish them. I don't mind saying that in 1981 the retail sales total of our network was around $151 million. In 1982 it was $451 million. Eighty-three projections are for around $1 billion.

"If you could tell me when the market is going to be saturated, then I could tell you how many stores we would have a week before that point. We are not even close to market saturation."

As the franchise network grows, corporate headquarters demands more space. ComputerLand moved into its current headquarters, in Hayward, California, a year ago February; they've outgrown it already and are now putting up an identical building next door—to be ready later this year. Before then, the company will have to go off-site for more space. A few departments will be off-site for a number of months until the new building is ready.

ComputerLand corporate employs about 350 people in Hayward, two dozen in Luxembourg, one in Japan, and two in Australia. Unlike other computer-related businesses, this one has no difficulty getting qualified help.

"We have a waiting list of people who want to work here," says Faber. "We don't have specific educational or technical specialties, outside of the legal staff and a few CPAs. Our people are in distribution, warehouse, or administration. They're mostly generalists and have a variety of college backgrounds. We don't hire a lot of people with backgrounds in franchising. For the most part they learn it here.

"We look for smart people with high energy levels who are looking to grow and expand in the business. And who generally have a track record of success in other things they have done."

How does he measure his own performance?

In Faber's view, the clear successes are the establishment of more than four hundred stores in six years, the fact that average sales of the stores have grown dramatically, and the fact that only

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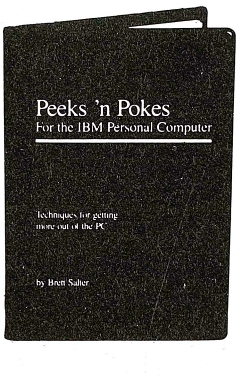
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six stores in the United States have failed—a failure rate of less than 2 percent.

Franchising Has Spelled Success. Faber thinks part of ComputerLand's success has come from its decision not to have company-owned retail stores—in other words to do franchising.

"We consider it a superior business form over our owning the stores," he says. "We attribute a lot of the success of the individual stores to the philosophy that we have owner-operators running the stores, not absentee owners. You cannot hire, train, and motivate a manager to anywhere near the motivation of the owner of the business."

Given the twenty years he spent in sales and marketing before coming to ComputerLand, Faber's emphasis on motivation makes sense.

"The key common denominator we find with almost all our franchisees," he asserts, "is a prior business record of success—although that success may not have been in retail. Maybe half a dozen have any retail background. Whatever they have done, they have succeeded at it. Part of the acknowledgment of that fact is that they have acquired a certain level of net worth that allows them to pursue a franchise. We look for high energy levels and a track record."

The typical franchisee, he says, is male ("although we have a fair number of females—maybe as high as twenty percent"), is mid-thirtyish in age, and has some experience with computers—either in a sales or marketing position with a manufacturer or in some capacity with a large computer user. The typical ComputerLand owner is not a stranger to computers.

"We don't sell the franchise. We are continually looking to match with people who want to be in the business of retail computing and who have a high level of desire to be a ComputerLand franchisee."

One measure of a candidate's motivation is his willingness to put up $150,000 to $300,000 for a ComputerLand franchise. That figure includes a $75,000 one-time fee to the corporation. Faber emphasizes that the money is not paid totally up front, and that ComputerLand does not participate in the financing. Once on board, the franchisee pays a royalty of eight percent of the monthly gross sales, plus another one percent into a corporate advertising fund.

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Many who watch the computer industry complain of a lack of trained salespeople to advise first-time buyers. Faber contends that's not a problem at ComputerLand.

"More than eighty percent of the volume in ComputerLand stores is with professionals and business people," he explains. "They are not so naive as not to know anything about computers and walk into a computer store and say, 'Someone tell me what I need and what I can do with it.' That's dreamed up by writers. That's not what really happens.

"Generally, the businessman knows precisely what he wants to do with what computer. That's the most common guy who comes in, and he's done his own investigation before coming into the store. He's seen a friend's machine or the guy's in the next office. He comes in and wants a specific demonstration of something that he already has some knowledge of. Or he has a very good idea of what his problem is and he's looking for a solution. He can describe that. That's a very simple sales situation—to match the solution to the problem.

"Moreover, the major business out there is professionals and people in larger companies. The small businessman is also a small part of the market. When he does come into it, he is knowledgeable.

"That's not to deny that salespeople need more training. They do, but that's true whether the potential customer is a small businessman, or an executive with a large company, or a professional writer, or a housewife who wants to learn more about computers, or a teenager who has ideas about games but thinks there's something more to it.

Salesmanship—An Area of Concern. "Professional salesmanship *is* an area of interest and concern to us," he concedes. "With outside assistance, we have created a professional sales training course that is taken around the country and given on a regional, decentralized basis. We have probably a dozen sessions a month in various parts of the country. The sessions are two-and-a-half days long, with a maximum of twenty salespeople per session."

Faber describes the content of the course as "how to interface with customers, to find out what their interests are and how to satisfy those interests and needs."

When pressed, Faber admits that ComputerLand does have trouble finding experienced, successful salespeople. And sales managers. While the stores do most of the looking, ComputerLand corporate provides guidelines to assist in the search and evaluation process.

The company also provides a two-week manager-training class for new franchisees. As for product knowledge, corporate leaves that to the twenty different hardware manufacturers and two hundred-plus software vendors from whom it buys.

A major benefit that ComputerLand provides its franchisees is the power of quantity buying through corporate headquarters—or "one-stop shopping." The corporation buys about five thousand different products and resells them at cost to the stores, who, Faber says, are free to carry what they want.

"It has no bearing on the success of individual stores or their relationship here whether they buy a product through our central purchasing function or not. Our job is to get the very best prices on an international contract basis with vendors, so that the motivation

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for the stores is to want to buy it here. One, because of pricing, and two, because of availability."

Faber stresses that ComputerLand does not try to influence the buying decisions of store owners, or what products they sell.

"Those are their decisions, based on their market conditions. If we have twenty manufacturers of computers and the average number carried by our stores is six, we take care not to influence which six they carry. That usually falls out fairly naturally."

The same kind of local market considerations, of course, apply to stores' software buying decisions.

"Stores that cater to consumers as well as business and professional markets," Faber explains, "are going to carry many more titles in entertainment software. Those stores are usually outside major metropolitan areas, in areas where there are fewer stores and fewer of the heavy mass merchandisers who carry the game machines."

ComputerLand used to classify its stores by size, but they've discontinued that policy. Says Faber, "What we have found as the market matures is that a store that may be the only ComputerLand in Rapid City, South Dakota, has a market potential and a profit potential equal to the twenty-fifth store in the San Francisco Bay Area. That line kept getting more and more blurred, so early in 1983 we decided to eliminate the line."

Recently, however, ComputerLand has begun experimenting with a smaller, more entertainment- and education-oriented store, called a satellite. About two dozen of these are planned for scattered locations around the country.

"The satellite is aimed at the consumer market," Faber explains. "It is not designed to do large demonstrations of business productivity applications. These stores aren't big enough for that, they aren't staffed that way, and there's no service department. The key to the satellite is that it is associated with a full-service mother store."

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He goes on to explain that the standard franchise store must have a service department with at least one trained technician. Available service has always been a ComputerLand requirement.

Computer "Boutiques." ComputerLand is also experimenting with what it calls "boutique" stores, housed within department stores such as Bullock's in southern California. While also aimed at the home and entertainment market, the boutiques will offer a broader product selection than will the satellite stores.

ComputerLand's support for its stores also includes product review and evaluation. Ed Murphy handles that end of the business.

Murphy, twenty-nine, came to ComputerLand in late 1981 from the Sierra Club, where he had been national publications director. He had no computer background at the time he started ComputerLand's software department. He was hired, he says, for his management and entrepreneurial skills.

Murphy, who oversees a staff of software experts, sits on the company's bi-weekly review committee. Six franchise owners, representing different regions of the United States, meet via conference call to exchange information and offer evaluations of proposed additions to the stores' offerings.

"We have to buy carefully," Murphy says. "We have no capability to dump software; we're not a distributor speculating on product. We react to demand from the stores, rather than pushing product. We're a pull-through channel."

Can the small, independent software writer get into ComputerLand stores on an equal footing with the larger, better known vendors?

Faber says that it's difficult. "We're not a publishing company. The small vendor would need to get with someone who has the publishing capability and the marketing capability. Also, he's got to let the world know about the product. Most important, he's got to be able to reproduce the product, document it, and package it. Those are the things we evaluate. If the documentation is inadequate, it has a tremendous negative reflection on the product."

Faber's view of this industry's future will probably astonish no one. "I think IBM will dominate," he says. "Also Digital Equipment. Others if they want to—for example, Hewlett-Packard. Apple has potential.

"I guess that in five years, if there are ten companies doing a majority of the microcomputer business, two or three will be Japanese. They have outstanding products, they have good markets in Japan, and they dominate in peripherals and monitors."

Among the smaller companies, he sees continued influence from Texas Instruments, Atari, and Commodore.

"There are other good, small companies," he adds, "but I'm not sure whether they will consolidate with other companies, or break through into a significant portion of the market, or decide to pick a narrow niche. Companies like Altos, Fortune, Cromemco, Zenith, NBI, Archives, and Osborne."

Faber reserves special praise for Adam Osborne and what he calls "a brilliant marketing approach. Osborne," he explains "made pricing breakthroughs. He made interesting marketing moves with the bundling of the software. I think we'll see more companies doing that. The portability was not the big issue. It was the bundling of the software and the pricing. And, of course, the magic of Adam Osborne. He's a magical guy."

At age 50, Faber shows little inclination to look back. About what he has learned or what mistakes he has made, he says only, "The truth is I'm not sure there's anything to tell about either side—about successes or failures. I've been in this industry twenty-six years. Every year has been a little more exciting. Wherever you are in your life, you are the sum total of everything that's gone on before." ▲

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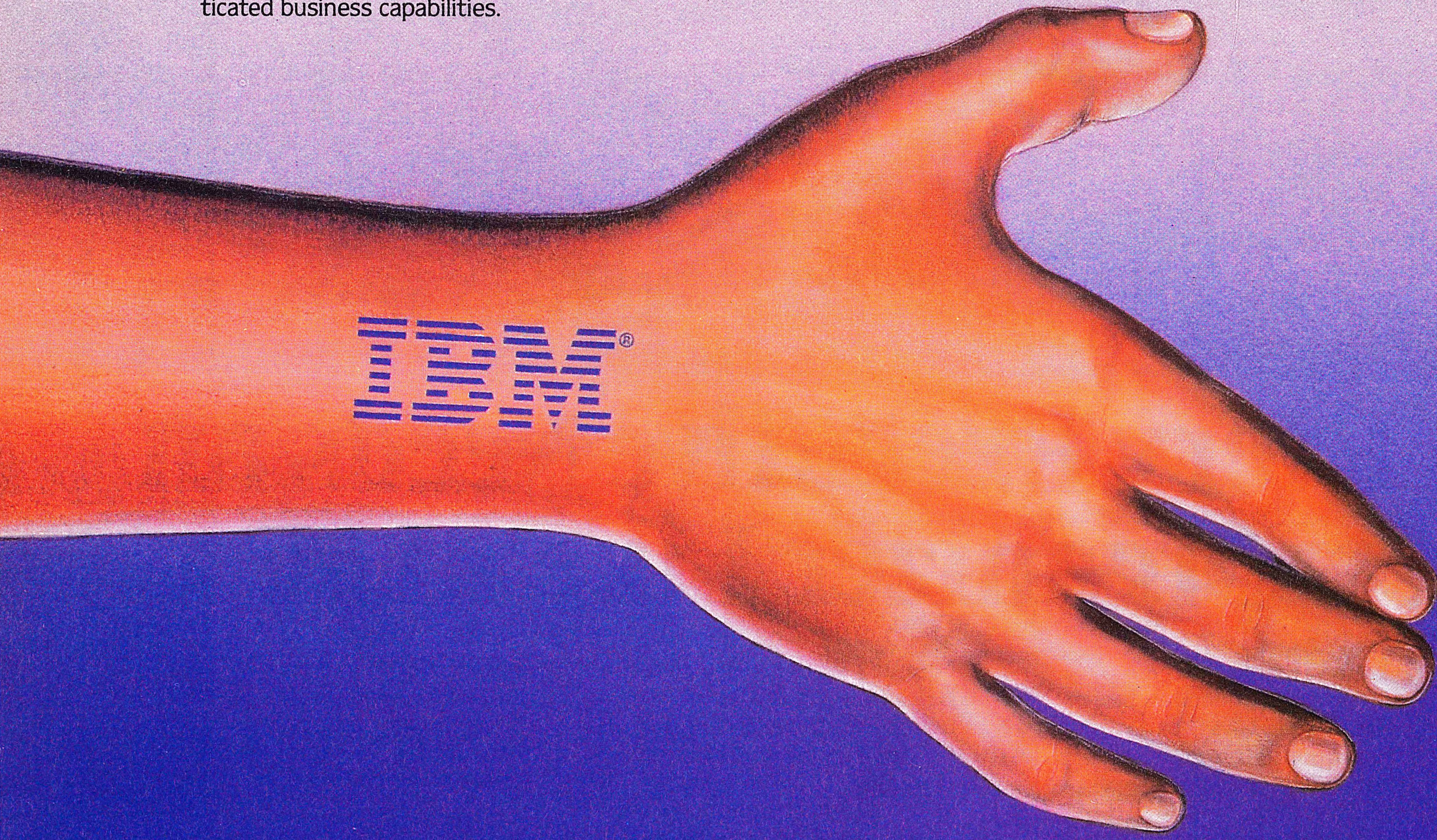

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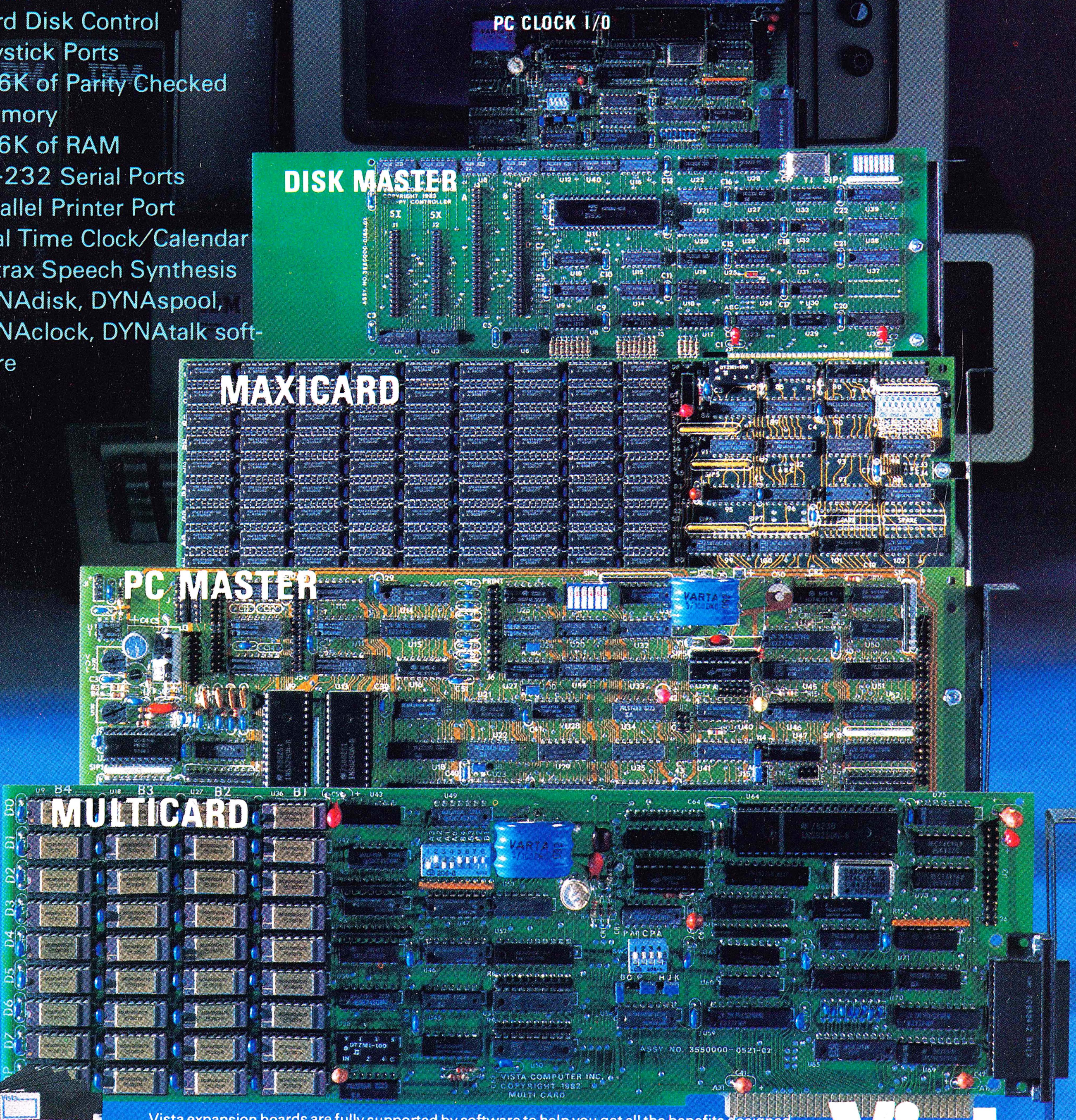

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COMMLINES

BY KEVIN GOLDSTEIN

> *"In the eighties, through a combination of microelectronics, computers, and communications technologies, the magic word is 'telecommunications.' There has never been another market like it, and companies all over the world are scrambling to gain a foothold in it."*
>
> —from *The New Alchemists*
> by Dirk Hanson

In the seventies, the hi-tech start-ups that were the highest flyers on Wall Street made integrated circuits. The hot tip today is companies that are in telecommunications.

IBM won't sell you an XT Personal Computer without an asynchronous communications card. That's how important the company thinks communications are to the pc user.

Why? What's all the fuss about, anyway? The basic concepts of telecommunications, and the hardware to implement those concepts, have been around in one form or another for years. Why now, at a time so ominously close to 1984, has the whole area of telecommunications become the darling of computer literati?

This is the first installment of a monthly series on telecommunications. This installment is about possibilities: the ways in which telecommunications might change our methods of business and pleasure in the coming years. Telecommunications has its own jargon and concepts, and in future installments, we'll unravel the jargon and look more deeply into the techniques used in various telecommunications schemes—how they work, their advantages and disadvantages, how to work with them. But before we roll up our sleeves and dive in, let's first step back and look at the subject of telecommunications from a different angle: What is it? What can it do for me? And why is it generating so much interest?

First, a Definition. Just as rapidly evolving technology is blurring the line between microcomputers and minicomputers, so it is sometimes difficult to put a hard and fast definition on the term telecommunications. So as not to constrain ourselves by the limitations of current technologies, we're going to use a rather broad definition of telecommunications: the communication of digitally encoded information (usually) through a serial channel.

If that definition leaves you unfulfilled, it's probably because what the definition does not say is as important as what it does say. Specifically, it does not limit or define the type of information we may be communicating—as long as we can digitally encode it, we can telecommunicate it. So, in addition to the data or programs—what we could generically refer to as text—that now account for the bulk of telecommunicated material, such entities as pictures and voice lend themselves nicely to transmission by telecommunication. Indeed, the old saw about a picture being worth a thousand words was never more true than in telecommunications; a picture translated into a bit stream (that is, the digital representation of the picture) is going to require thousands of times more bits than its caption. Thus it's likely that in the future, as the telecommunication of pictures becomes commonplace—for example, with the long heralded but as yet prenatal picture-phone—a lot of the bits being telecommunicated across the nation at any one time will represent not text data but pictures.

Or maybe voice. The phone company is proceeding with its plans to digitize the entire telephone network. Already, some of the trunk lines—the high-volume phone lines that connect local phone switching centers—are digital, and the phone company's ultimate plan is to extend digital transmission the whole way back to the individual subscriber's phone. (That's you.) At that point, you will no longer need to convert your computer's digital bit stream to an analog representation to connect it to the phone line, so—no more modems. But you will need a "digital telephone" to convert your analog voice to a digital bit stream—more or less the reverse of what we have now. A digital phone system should offer lots of advantages, as we'll see later in this series.

But back to our definition, and to what it doesn't say. Just as important as the fact that our definition doesn't limit the information we can telecommunicate, neither does it limit the transmission medium. When we think of telecommunications, we usually think of data transmission via phone lines. The easiest way to make a low-speed connection—for now, let's assume that low speed means 2,400 bits/second and under—between two computers a mile apart is via modems and a phone line, and that's clearly telecommunications. But suppose that both those computers are located on a college campus and that there's a constant flow of digital traffic between the two sites. In that case, it might make sense to throw away the modems and lay a dedicated wire connecting together the RS-232 ports of both machines. The end result is the same, though the price should be cheaper. (Actually, the end result should be *better*, since a dedicated connection, like the one just described, can support a higher bit rate than a direct-dial phone line. More about why later.) According to our definition, we're still telecommunicating, even though we've bypassed Ma Bell.

In the future, wires will be only one transmission medium out of some very esoteric choices that include fiber optics and lasers, ground-based microwave, and satellite microwave transmission. Or back down on earth, infrared; that little box you use to turn the TV off could also be used to input data to your computer from across the room.

Notice one element common to all our examples of telecommunicating: they all involve sending bits representing something or other, through some kind of transmission pipe, *one bit at a time*—that is, serially. In the example above, as long as we're laying a dedicated wire to connect two computers, we could conceivably lay eight wires and transmit eight bits, or a byte, at a time. (Actually, such a parallel interface would probably require a couple of extra wires for control information.) Theoretically, meaning if we wanted to spend enough money for wire and amplifiers, we could put together a transmission channel between our two mile-apart computers on which data could move just as fast as it does between our computer's RAM and disk.

But in a computer, we don't call sending data over an eight-bit bus, between disk and RAM, telecommunications—we call it sending data over a data bus. So it hardly seems proper to consider calling our hypothetical eight-bit-wide transmission channel between two mile-apart computers a telecommunications link; it's a data bus, it's a parallel interface—but it's not a telecommunications channel.

The Favorite Serial. The reason long-distance communications channels are serial is that it's always cheaper to string one wire instead of ten. So a characteristic of telecommunications channels is that they have only one "transmission pipe"—that is, they are serial channels. The physics of the situation says that if you've only got a single physical transmission pipe, it's most efficient to send data serially. That's the reason for the caveat hanging off the end of our definition: the communication of digitally encoded information *via a (usually) serial interface.* (The "usually" is a hedge—just in case tomorrow somebody comes up with a way of transmitting in parallel that is more efficient than transmitting serially. One never knows.)

Well that's what telecommunications is. Now, what's it good for?

You're probably already aware, possibly without having given it any conscious thought, that telecommunications is vital to industry, as well as an indispensable element in many conveniences we take for granted. Without telecommunications, for example, it would take even longer to get your credit card purchase approved, your broker would be hopelessly behind in the latest market quotes, and we wouldn't have twenty-four-hour teller machines (which might be just as well). Indeed, banks depend so heavily on computers and telecommunications that a breakdown in either system could be catastrophic. The entire Eurodollar market operates not by sending pieces of paper back and forth, but by transatlantic computer transfers. Such electronic funds transfer (EFT), when it finally takes over in this country, could relieve the consumer of a particularly obnoxious habit of banks—their irritating tendency to withhold funds on deposited checks for time periods ranging from too long to unbelievably long. That exasperating wait is called the *float*, and according to Dirk Hanson in *The New Alchemist*, the major deterrent to the more widespread acceptance of EFT is that it would sink the float. Considering that a bank (or company—if you're big enough, you too can play the bank's game) can make millions of dollars per year on the float, it's no surprise that the barriers to EFT are more political than technical.

It's obvious then that, even before the personal computer invaded the home and office, telecommunications intersected the individual's life in scores of places. And as important as telecommunications is today, it's going to be that much more important when almost everyone has access to a microcomputer, either at home, at school, or at the office. The effects will be felt in ways both big and little; with luck, the conveniences promised for the future may atone for the inconveniences of the "do not fold, spindle, or mutilate" past.

To those of you sharing your house or office with a personal computer, some of those conveniences are already reality. Remote shopping, for example. While there's still more talk than action about shopping via "video catalog" (although the few full-fledged experiments currently being conducted seem to be successful), at least one form of shop-at-home is already available, and it could save frequent flyers a lot of money. The *OAG* (*Official Airline Guide*), an expensive publication that lists the schedules and fares of all current flights, has just started publishing an electronic edition; the airlines had so many fares, and were changing them so often, that it was impossible to stay current any other way. In addition to timeliness, the electronic edition offers computerized searches to find the least expensive routing, an otherwise time-consuming, frustrating, and not-always-successful job.

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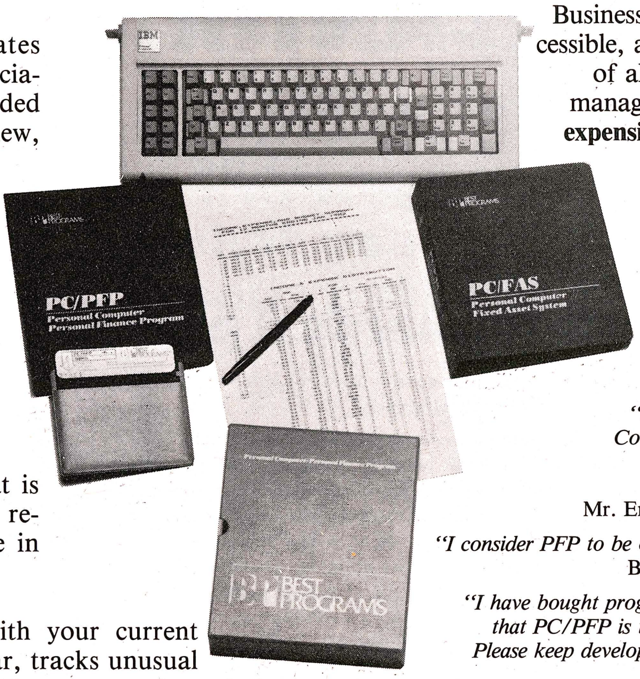

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Corey Sandler **PC Magazine,** Vol. 1, No. 10

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Will Fastie **Creative Computing,** January 1983

"My overall impression of PC/PFP is a good one...suits the needs of a great number of people who want simple, straightforward help in their personal finances."
Cliff Smith, C.P.A. **Capital PC Users Group Monitor**

One use of the electronic *OAG* could easily save you hundreds of dollars.

Bullish on Computers. In the sixties, it seemed, the popular viewpoint was to disparage technology. With the fade-out of the Vietnam War and the realization that computers have plugs that can be pulled, that viewpoint has undergone an abrupt about-face, to the point that it now seems like every month, one, two, or three popular magazines or newspapers publish articles about all the wondrous things the personal computer will do for *you*. What's interesting about those articles is that practically every service they list requires not so much a personal computer as a person using that computer as a communications tool. Consider such oft-cited marvels as access to databases, already available from such companies as the Source (McLean, VA) or CompuServe (Columbus, OH)—or for a little more panache, how about illustrated databases, such as the videotex services now available abroad.

Or maybe computerized education? That could be a roomful of students, all linked by electrical umbilicus to the teacher's computer. Take it one step further and you have a cityful of students linked to each other and to an instructor over phone lines. Then there's remote banking, thermostats you can control with a phone call (not to mention the coffee pot or stove), store-and-forward message-taking—the list goes on and on.

All of which could be a mere prelude to the real revolution that the personal computer-telecommunications duo could foment: a change in the very way society conducts its business and a concomitant change in the lifestyle of each of its members.

It has been estimated that only 40 percent of our work force is engaged in making goods; the rest are manipulating information. The first, and right now major, target for new telecommunications applications is the office. And while local area networks (more about them later) can offer users access to expensive centrally located resources (printers, hard disks), as well as such services as electronic mail (but you've heard this list before), the real changes will come by extending the reach of the network out of the physical office. The result could be the true sleeper of the personal computer revolution—the office-at-home. And while that does not mean, nor is it meant to imply, that offices as central meeting places will ever become outmoded (those who think so underestimate the importance of the interpersonal dynamics that can occur only in face-to-face situations), it does mean that we may be in for some mighty changes.

Indeed, the transition has already started in some professions. As just one example, if you're a writer, you can now research, write (on a personal computer, of course), and submit your articles without ever leaving the comfort of your own home. You can even submit your copy direct to the typesetter. So while the Marshall McLuhans of the world will offer you varying estimates of the likelihood that such a revolution will come to pass, it's not impossible that in the next couple of decades the combination of personal computer and telecommunications could do more to change America's work habits than any other phenomenon since the move off the farm. If and when that happens, the information society will truly have arrived, and at its heart will be a personal computer linked to a communications network.

Coming in Future Installments. Sure, you've heard of local area networks (LANS), but have you have ever heard of *small* area networks? Next month, we'll take a look at some of the very personal ways in which telecommunications might serve you. We'll also talk briefly about PBXs, store-and-forward message-switching, and other such esoterica. And if there's space, we'll get down to the real nitty gritty—like what that saw-toothed looking doodad at the top of this column represents, and *why* your pc communicates so . . . *asynchronously*. ▲

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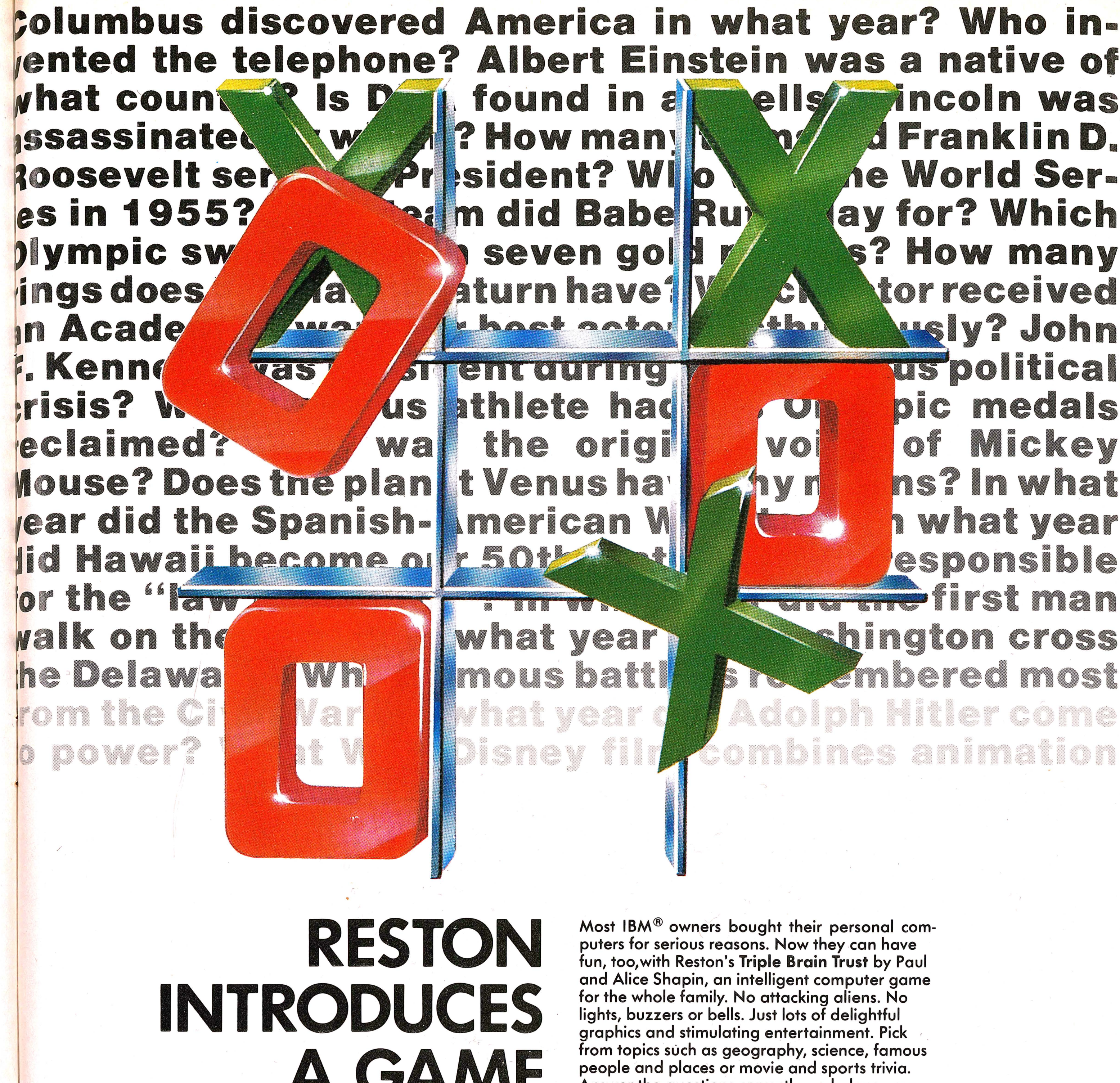
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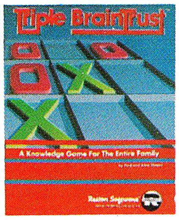
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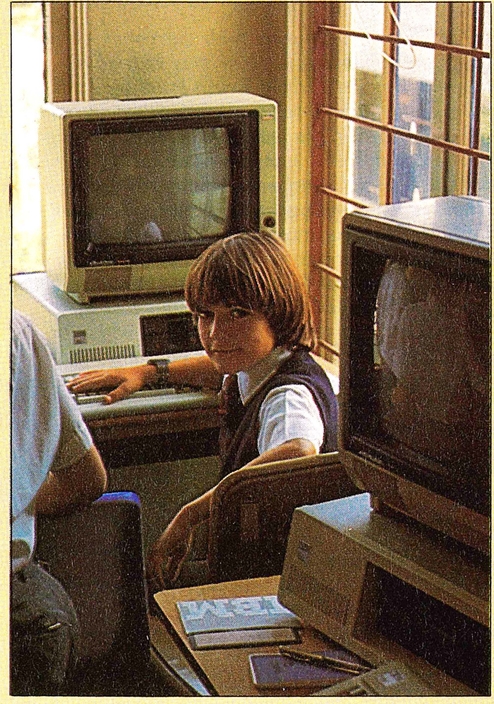
THE NEW KID IN SCHOOL

by JoAnn Levy



It's a sunny April morning on a green and gentle hillside. This part of Redondo Beach, California, hugs the northern edge of the picturesque Palos Verdes peninsula, and a postcard view of the blue Pacific shimmers in the distance.

This is, however, no place and no time to ponder wildflowers and springtime. The grass belongs to a playing field and the seven acres of hillside belong to a school. The nine-thirty bell shatters the air and the idyllic scene. Clusters of children of various heights migrate noisily between classrooms. Outside the door marked "17" in tarnished brass numerals, nineteen first-graders form a ragged double column.

The teacher in charge of Room 17, Susan Nakaba, opens the door as soon as these seven-year-olds put forth their best effort at order. The children file in, lining one wall until Nakaba signals it's okay to take seats.

'This first-grade classroom looks like almost any other across the country . . . except for five IBM Personal Computers.'

This classroom looks like almost any other institutional example of the functional, no-frills sixties—perforated white acoustical ceiling, fluorescent light fixtures, one wall consumed by a dusty green chalkboard. The floor is unimaginatively checkered in dull green and white. Nondescript school desks and molded plastic chairs, some blue, some orange, form five uneven rows. Clinging to one wall is a large and colorful poster-paint mural that, stylistically, could be Grandma Moses attempting French impressionism. Two walls have corkboards with magazine pages pinned to them.

Across the country are thousands of similar classrooms. This one, however, has five distinguishing features. Arranged against two walls, the floor beneath them snaked with extension cords, are five IBM Personal Computers.

The first-graders in this classroom, like seven-year-olds everywhere, are being drilled. But they're not reciting the familiar litany of "See Spot run." To one of the teacher's several questions, they respond in unison, "Enter key!"

Drill over, the children, assigned in pairs to the machines, tackle *Fact Track* and *Arithmetic Games*. Queried by the machine for the sum of one plus three, blonde-haired Magnon King, pronounced May-gan ("but not spelled the Irish way," she explains), resorts to the tried-and-true method, holding up the fingers of one hand and counting with the other. "Hit the four," she urges her partner, so she can have her chance at teamwork; *she* gets to push the enter key.

This is Magnon's second time with the computer, and she anticipates that her "daddy is gonna get one 'cuz I like to do English and math."

Above: Susan Nakaba, teacher at Le Lycee's Redondo Beach campus, watches first-graders Magnon King and Amber Olson demonstrate their prowess on the pc. Says Nakaba, "The students here are going to be jumping ahead of me without any problem at all." Opposite page: Cyril Wohrer, a fourth-grader at the school's Los Angeles campus, will be programming in Basic next year.

Less confident is a boy seated at the next machine. In response to the *Fact Track* menu, the teacher instructs, "We're going to do one problem every ten seconds, so type in ten," but the youngster hesitates. "How about five minutes?" he asks, suggesting the art of negotiation might also be part of the curriculum at what is obviously not an ordinary school.

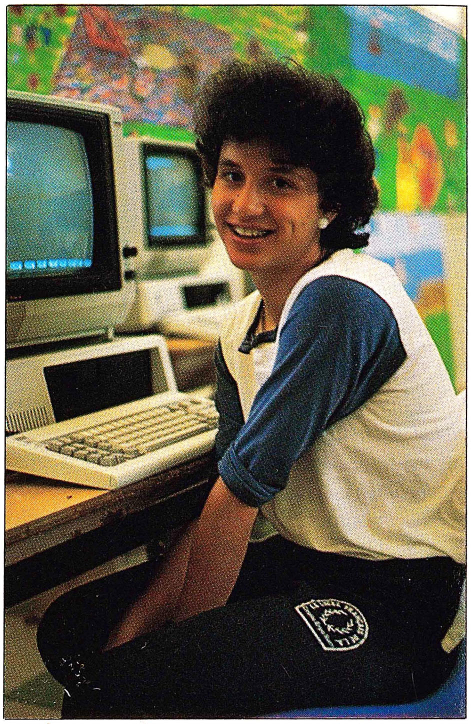
A few wisps of hair escape Magnon's pink barrette, the only deviation from the school uniform of navy and white. Most of the children are in sweat shirts, the school's sports uniform, on which the school motto, *"Cogito ergo sum,"* is emblazoned beneath a laurel wreath. One Charlie Brown look-alike sports his individualism in a too-long T-shirt proclaiming " '82 Friendship Jogathon."

More typical is the full uniform. For boys, navy blazer, white shirt, gray pants, burgundy tie. For girls, navy blazer, white blouse, gray skirt or jumper, navy socks.

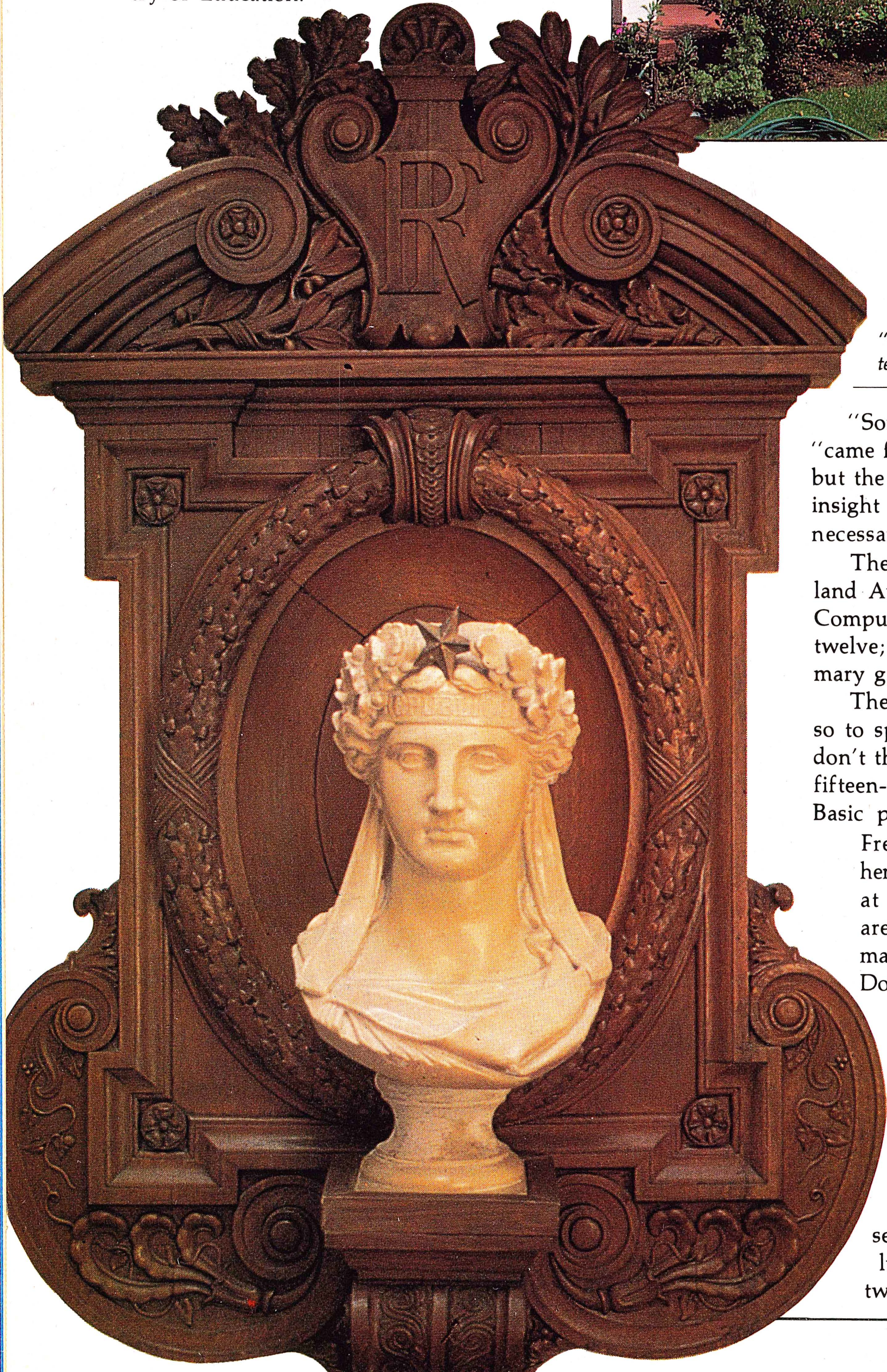
Obviously, this is a private school—one that *Los Angeles* magazine has consistently ranked among the top private institutions in southern California. Room 17 and the remaining seven acres at 220

Via Riviera, formerly Parkway Elementary School (closed by the Torrance Unified School District when enrollment dropped), was purchased by Le Lycee Francais de Los Angeles two years ago.

Enrolled at Birth. Le Lycee has no enrollment problem; its waiting list numbers in the thousands, with many parents submitting applications as soon as their children are born. The unique bicultural, bilingual school, modeled after the rigorous French public schools, or lycees (lee-says), provides traditional, structured programs based on the European system; it is accredited through both the Western Association of Schools and Colleges and the French Ministry of Education.



"I thought computers would be really boring," says Sheida Asgari, a tenth-grader at Lycee Francais de Los Angeles. "But they're fun!"



"Some of the impetus for getting computers," says Nakaba, "came from parents, who want their kids to be part of the future, but the school's administrators are equally responsible. They have insight as well as specific educational goals; they'll do whatever's necessary to remain front-runners educationally."

The Via Riviera campus, like Le Lycee's original school on Overland Avenue in Los Angeles (which also has five IBM Personal Computers), enrolls students in grades kindergarten through twelve; a third campus in Pacific Palisades serves only the lower primary grades and has one pc.

The computers came to school this January, enrolling midterm, so to speak, but they made friends easily among the students. "I don't think there's anybody who doesn't like the computer," says fifteen-year-old ("almost sixteen") Sheida Asgari, who is learning Basic programming as part of tenth-grade Algebra I. Fluent in French and English, Sheida has been here two years from her native Iran. Although most of the one thousand students at the three campuses are American, twenty-three nations are represented. Many students are the children of diplomatic and consular officials and of celebrities (Marlon Brando, Donald Sutherland, Francis Ford Coppola, George Segal). But faculty and administrators are quick to insist that Le Lycee is "not a country club" but a serious school demanding discipline and hard work of its students.

All students learn French, of course, but language requirements are expanding. "Our objective," says Nakaba, "is to have fifth through seventh grades studying Basic, and grades eight through twelve learning Pascal. They'll learn these languages the way they learn French." Studies are a serious matter at this school, and students often spend their lunch hour studying. At one o'clock on this sunny April day, two breathless teenaged boys dash into room 17, scrape two

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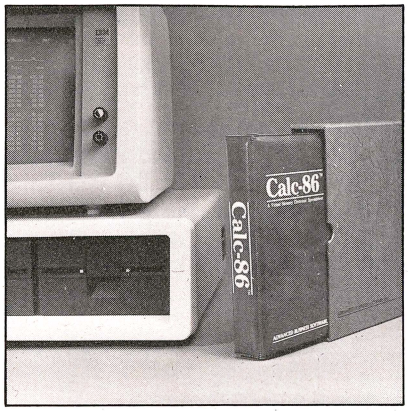

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plastic chairs up to one of the machines, and are soon deep into the finer points of *if-then*. Other teenagers are close behind. By three minutes past one, all five machines are displaying line numbers and code to ten pairs of eyes, the students doubling up to cram for an exam and then top off the hour with a little recreational *Decathlon*.

"No food near the machines," warns Nakaba, the self-appointed guardian who feels the responsibility keenly. "Lunches to the back of the room." Three students send brown paper bags, presumably containing food, skidding across the green and white floor like misshapen bowling balls to pile up against the rear wall.

"Even with the discounts, there's ten thousand dollars' worth of equipment here," she explains. "I was so protective, even initially when they weren't working anyway. It's taken me four months to loosen up enough to even let other teachers in here when I'm not."

The twenty-eight-year-old Nakaba, who studied biology and chemistry and earned a master's in education from Loyola Marymount University just four years ago, knew nothing about microcomputers when the five IBMs were delivered. "I saw a demonstration at the Overland campus the first of December and by the end of the month we had them. I spent hours on the floors of computer stores, looking for good books to teach myself and poring over the IBM manuals. But now that I've got the hardware up and running, I'm really happy with it.

"And I've discovered they aren't fragile," she adds over her shoulder as she descends on two overenthusiastic *Decathlon* players. "Careful, you're going to break the keyboard!"

The use of room 17 is carefully controlled. At this campus, all teachers—primary grades, social science, language arts, science, and math—use a sign-up calendar to reserve the room for their classes. The midterm acquisition of the computers prohibited normal scheduling and inclusion in the curriculum, but the calendar fills quickly each month.

That's a special satisfaction to Nakaba, who, in a two-and-one-half-week orientation course of her own designing, introduced the pc to the Riviera campus' teaching staff. "It took a little PR to overcome some initial reluctance," she says, "but now fifteen teachers are regularly using the computers to assist their subject areas, and all but three were computer illiterates."

Geometry Made Easy. Of her own math classes, Nakaba says, "If it makes sense to me, I can teach it to anybody. We're having a lot of fun with our geometry section and with formulas. The kids understand the concept of square root much better; they know what it is now.

"For me, having the computers is now beyond the stage of being scary and, finally, beyond the stage of being frustrating. It's starting to be fun."

Darrell Hill, who teaches English, uses SRA's *Wordskill* and *Typing Tutor* programs. "*Wordskill* has a competitive aspect to it and competition makes learning interesting for twelve-year-olds. Within two weeks, most students showed markedly improved vocabulary scores, although it's too soon to say whether the credit goes to the computer, the program, or the novelty." Hill is using *Dungeons and Dragons* to induce students to write their own stories.

The school also has Alphanetics's *Word Whiz*, *States 'n' Caps*, and *U.S. Motors*, Metamorphics's *School Daze*, and Spinnaker's *Story Machine*. But finding appropriate educational software remains a challenge. Filling one gap is a Pascal package provided by one of the parents, David Cronshaw, who also loaned a second drive for one of the machines to ease the package's implementation. The pcs are bare-minimum single-drive 160K systems.

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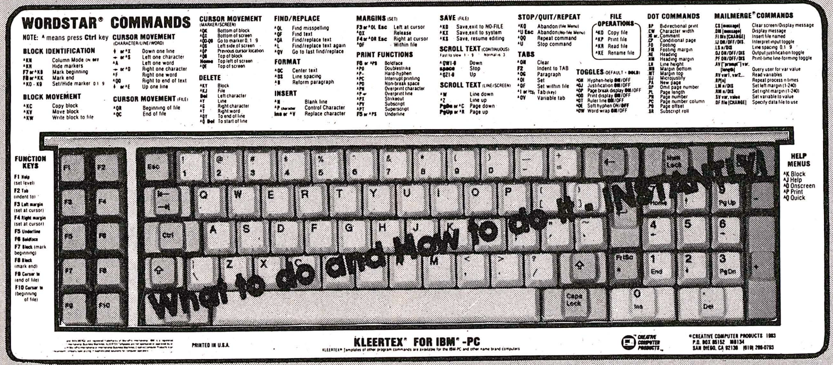

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''We have Microsoft's *Decathlon* and *Adventure* because the kids brought them in,'' offers Nakaba. ''The kids only get to play games as rewards, but they really want to get *Flight Simulator*.'' The school, of course, will buy only educational software, so the students are planning a bake sale to raise the money for *Flight Simulator*.

Fund-raising for computer equipment is precisely how the pcs came to school in the first place. ''We had a big event at the school,'' explains Dr. Raymond Kabbaz in his spacious office on the second floor of the classical Overland campus building (where he and his wife, Dr. Esther Kabbaz, founded Le Lycee in Los Angeles in 1964). ''The parents raised the monies necessary. Two thousand people participated and we were able to pay cash for the IBMs. Now we have special funds for every year to develop the program and keep it going.''

> *'Our objective is to have fifth through seventh grades studying Basic, and grades eight through twelve learning Pascal. They'll learn these languages the way they learn French.'*

And why IBM? ''We had been studying many possibilities,'' says the educator, whose precise speech still reflects a European accent. ''Yes, indeed,'' adds Virginia Rea, the school's chief financial administrator, ''and we came to a very logical conclusion. After all, we researched, went to a number of other companies, were inundated with brochures, data, sales pitches.''

''We went to IBM's seminar here in Los Angeles,'' recalls Kabbaz, ''and we were very pleased and impressed. This was a seminar solely for educators and they answered all our questions. I think 99 percent of the educators present—and some had come from as far as Georgia—were convinced to go with IBM.''

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Mark Mrotek, who teaches mathematics and now programming at both the Overland and Riviera campuses, elaborates. ''We could have done the same things with a less powerful and less expensive machine, but there's now the responsibility on our part, because we have this machine, to utilize its potential and power.''

This fall, Le Lycee's upper-level computer programming course will be Pascal, with the lower grades learning Basic. ''The reason we're going to teach Pascal,'' explains Mrotek, ''is that Basic is pretty much a mathematics-oriented language, and we want to teach computer language for programming and not as a tool for teaching mathematics. Some of our students who are not mathematically inclined might be turned off because they'll see the computer only as a large math calculator rather than as something that can do a lot of other things.

''Also, the Regents of the University of California will give college credit for high school programming only in Pascal. We intend to set up a full 120-hour Pascal course and get our students college credit.''

The Los Angeles Lycee claims that every one of its graduates has gone to colleges or universities here or in Europe—including the Iviest. A representative of Yale University has said that graduates of the worldwide lycee system are ready to enter there as sophomores and that some have entered as juniors.

Such academic excellence is of especial pride to the Kabbazes, both of whom, before earning the Sorbonne's equivalent of the Ph.D., graduated from the French lycee founded by Napoleon two hundred years ago and have taught in the lycee system in Africa, Europe, and New York. Many lycee teachers hold the doctorate or its French equivalent, and a number have been recruited each year in France, teaching here for a maximum of three years.

The education is strict, although Latin and ancient Greek, while still offered, are no longer required. Students are expected to work long and hard here, and competition is encouraged. Dr. Esther Kabbaz, the school's director, commenting that some private schools avoid competition among students because someone might feel bad, says, ''Let him feel bad. Maybe he is a lazy brat. The French attitude is, 'Let those who succeed feel good.' ''

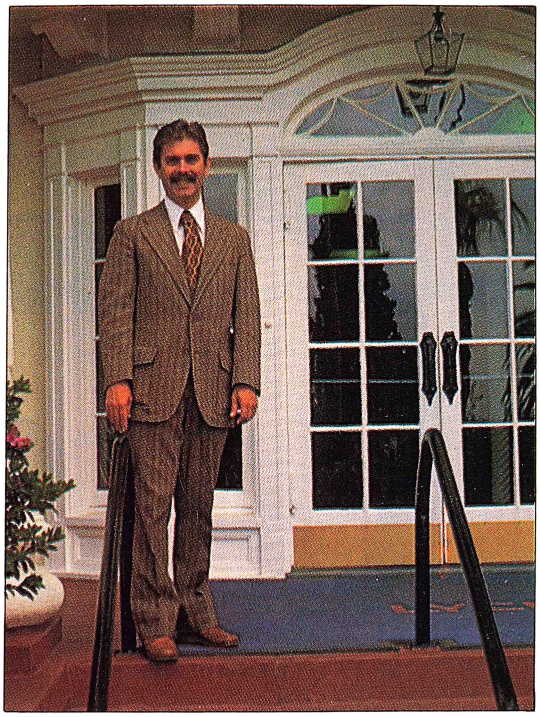
Jodie Foster Excelled. Actress Jodie Foster, who was valedictorian of Le Lycee's class of 1980, was extremely ambitious and bright, says Madame Kabbaz. ''After one year she switched from the American section to the French section. And after one year she was first in the French section.''

As in lycees everywhere, whether New York, Rome, Mexico City, or London, classes are taught in French and in the host country's language. While all students graduate fluent in the French language, students enrolled to take the entire curriculum in French prepare for the French government test called the baccalaureat; those who pass are eligible for study at European universities.

In the ninety-five nations in which the system is established, the lycees are pedagogically united but financially independent. Acquisition of computers, obviously, is at their own expense. Although the New York lycee has, with Radio Shack machines, introduced computers into its curriculum on a limited scale, the Los Angeles lycee is the first to wholeheartedly endorse computer education.

Educators throughout the system will watch for the success or failure of the program. Many, according to Dr. Raymond Kabbaz, suspect that the computer is just another mechanical teaching machine like those developed in the fifties, destined to fade away as they did. Kabbaz, under the auspices of the Encyclopedia Britannica, worked with such machines, concluding almost immediately that

Will Snow (left) and Mark Mrotek (right) teach Basic and Pascal. Below, fourth-graders Elsa Najar (left) and Tamara Haney (right) will graduate with a mastery of these languages—and of English and French.



they would fail to prove their worth. He has no such doubts about the computer, however. "It's the coming thing," he says confidently.

And how will the pc assist French instruction? Teachers at both campuses are anxiously looking for French programs, as well as other educational software. Meanwhile, Le Lycee's French section director, Anne-France Salomon, is working with IBM to develop various programs in French. "IBM has assisted Madame Salomon to go to France and work with her there on development of language skills, science, and math programs in the French language," explains Kabbaz, "which we will use here on an experimentation basis."

In the meantime, students of all ages here are learning to use the computer. Most of the Overland teachers entrust such instruction to Will Snow, who is found most mornings in the cramped room that was, so to speak, dusted off as a temporary computer classroom when the machines arrived. The shipping boxes are still piled high in an adjoining closet not much smaller. With the midterm start-up, the school was caught short of facilities, but a special room will house the machines come fall.

Sandy-haired twenty-year-old Snow is one of the new generation of computer whiz kids. Now a junior at the University of Southern California, he built his own computer while in high school, going into business with a classmate (now at Stanford and still running the business).

Snow has previous teaching experience at southern California's Pepperdine University, but here at Le Lycee he's faced with new challenges. "Who invented the first mechanical computer?" he asks a precocious group of ten-year-olds during a pop quiz. "Hint: His name rhymes with a vegetable."

"Mr. Potato!" quips a fourth-grader, gaining the expected giggles of her classmates and grinning with self-satisfaction.

Jokes and quiz over, Snow loads DOS into the five machines and tells the kids, "At the prompt, type in *basica*, then *space*, then *donkey*. You can play with that for five minutes while I correct the tests."

Precision Spelling. Soon, four screens are colorful with zipping cars dodging donkeys. At the fifth, a frustrated youngster asks for instructions again. Snow watches and discovers the error. The *e* has been left out of *donkey*. At least one educational by-product of computer use, for whatever purpose, is precision spelling.

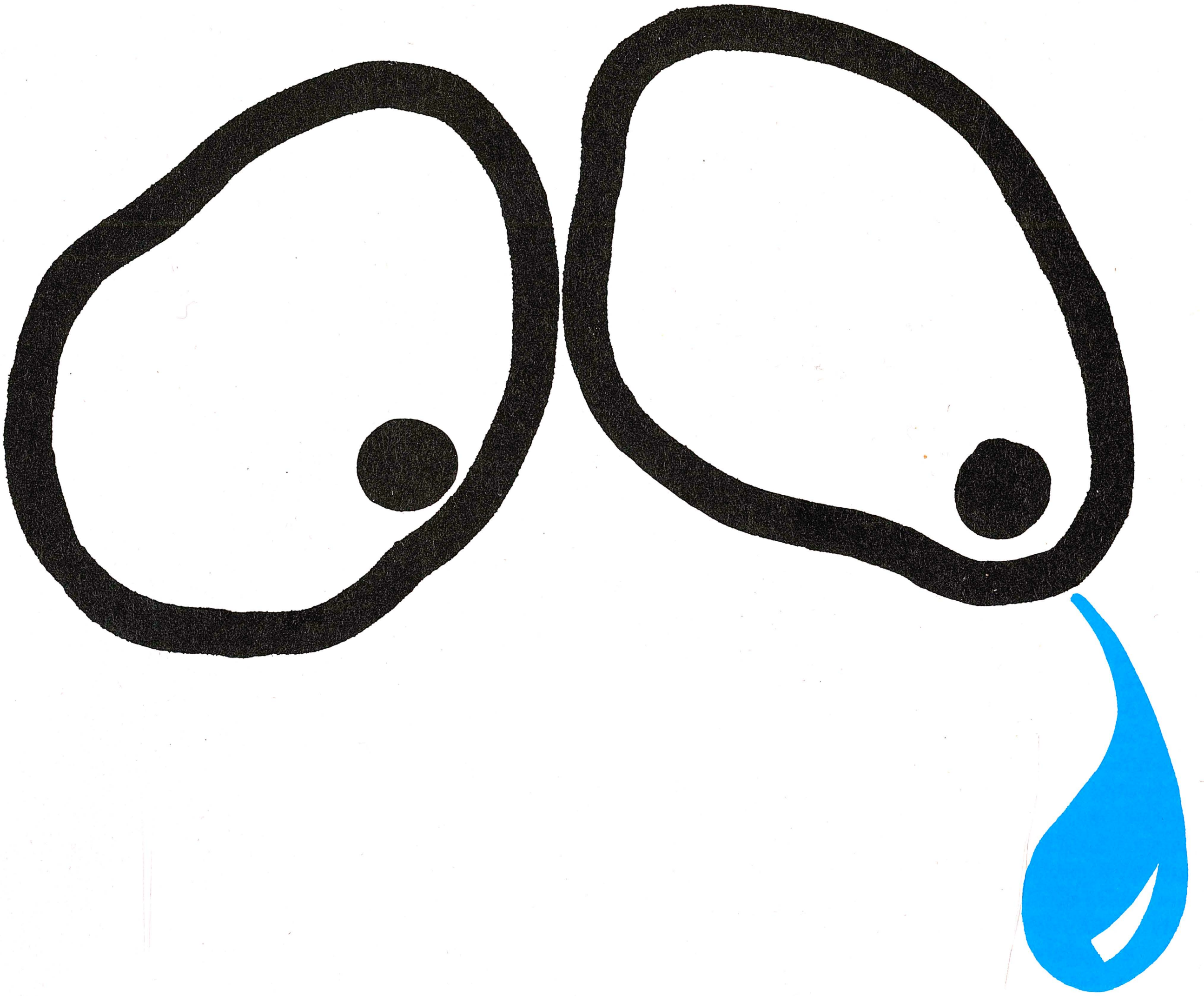
"Good job, Danny," says Snow, going over the papers while donkeys destruct in the background. "You got a plus one."

Danny acknowledges the praise without looking up. "I took some computer courses," he says. Seated, Danny can't get his feet to touch the floor, but he knows Babbage invented the first mechanical computer and he's an absolute whiz at *Donkey*.

Games are generally avoided, with the exception of math games. Says Kabbaz, "We don't want the students to have the idea that the computer is for games. We want them to learn problem solving, not just manual dexterity."

Next year, the curriculum will provide for more of that opportunity when a dozen additional IBMs are delivered. After that, Rea hopes to have a larger IBM installed for the school's accounting and administration. "We'll do the children first," she says. "That's what we're here for. It's important to have our students up-to-date in our new high-tech world."

That's not the only advantage of the computers for educators, however. "The kids will do anything for me so that they can use the computer," says Nakaba, hazel eyes twinkling. "Computers are the best weapon I've ever had." ▲



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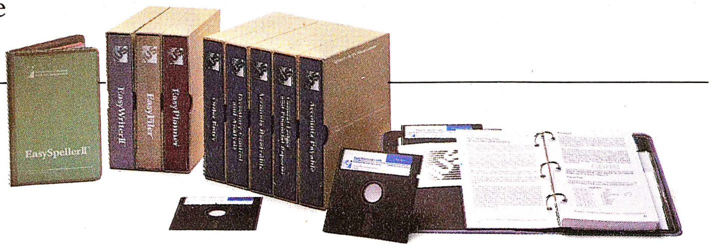

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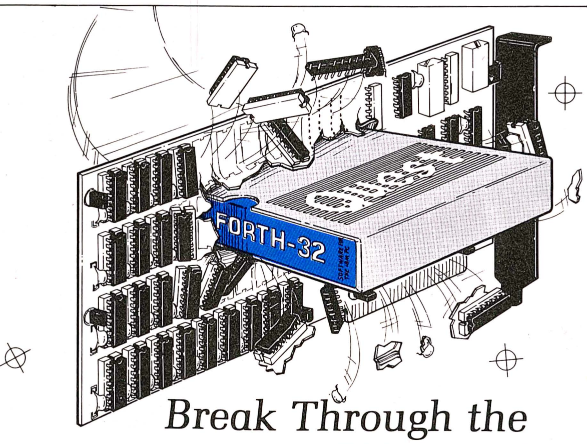
Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ Spend three days in New York at *PCExpo*, a corporate users' and vendors' trade show to be held at the New York Coliseum, June 8-10. Principal vendors in hardware, software, peripherals, and services will exhibit. Seminars will include the pc in the corporate environment, mainframe compatibility, networking, business graphics, word processing, and more. Several industry leaders will speak. Sponsored by **H.A. Bruno** (110 Charlotte Place, Englewood Cliffs, NJ 07632; 201-569-8542). $15 per day, includes seminars. Three days: $30. See your dealer for special $15 discount.

Δ The **Robotics Society of America** (200 California Avenue, Suite 215, Palo Alto, CA 94306; 415-326-6095) has been formed to strengthen the link between professional, amateur, and hobbyist interest in constructed intelligence and the making of robots. Social and philosophical issues are also addressed. Seminars, courses, meetings, and a newsletter are in the works. $25 per year. Corporate rate: $100 per year.



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Δ Was it murder? An accident? Suicide? These are the intrigues in the interactive prose adventure *Witness*, from **Infocom** (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). Based on the classic whodunits of the thirties; players have a twelve-hour time limit to solve a crime. Features complete-sentence parsing and comes with a package of physical and written clues. $49.95.

Δ Software for surveyors: *Surveyor's Aide* has a one-thousand-point capacity, traverse closure with bearings and angles, and all major coordinate geometry calculations included. From **First Principles** (Box 4236, Santa Rosa, CA 95402). $500.

Δ **D2 Enterprises** (Box 871, Shalimar, FL 32579; 904-651-3108) has announced hard disk file backup and restoration using *D2Back* and *D2Rest*. Copy random files from hard disk to floppy, even when the file size exceeds the size of the floppy. $35.

Δ The Tilt-Turntable, for any monitor, offers fifteen degrees tilt and 360 degrees of rotation to allow positioning for comfort and reduced glare. From **Systems Management Associates** (Box 20025, 3700 Computer Drive, Raleigh, NC 27619; 919-787-7703), the unit is available in three finishes, with a nonskid base. $54.95. Δ Templates are available for *WordStar*, *VisiCalc*, and the program of your choice. All commands are located right on the keyboard. *WS* and *Visi* model: $12.95. Do-it-yourself: $9.95.

Δ Up to thirty-six fields may be created in one file of *The Data Base Manager*, from **Universal Data Research** (2457 Werhle Drive, Buffalo, NY 14221; 716-631-3011). The package includes a report generator and label printer program. $199.

Δ For golf leagues, golf courses, and country clubs: *GolfCap* calculates USGA-type golf handicaps for 250 golfers per disk and stores up to twenty scores for each golfer. From **Systemics** (3050 Spring Street, West Bloomfield, MI 48033; 313-851-2504), the package prints lists by name or handicap, wallet-sized cards for each golfer, or small stickers for bag tags with name and handicap. Requires eighty columns. $49.95.

Δ **Computer Golf Service** (1700 Southwest Twelfth Avenue, Boca Raton, FL 33432; 305-392-6740) has announced *DataCap*, a golf-handicapping package that includes hole-by-hole analysis. Generates five different handicap reports. Optional customized golfer keypad. $595.

Δ An easy method for recording detailed information on daily food intake and exercise performance, *InShape* is a personal diet-and-exercise program from **DEG Software** (11999 Katy Freeway, Suite 150, Houston, TX 77079; 713-531-6100) complete with a food dictionary and automatic calculation of points for aerobic exercises. Various plotting functions, including sixty-day and fifty-two-week summaries, give an accurate picture of patterns over a period of time. $95.

Δ The keypad keys control the cursor in a customizable, full-screen word processor called *Textra*. Editing features include block copy and move, global search and replace, and file merging. From **Ann Arbor Software** (Box 7345, Ann Arbor, MI 48107; 313-769-9088). $70. Demo: $10.

Δ Version 2.0 of *Gapmanager I*, an asset/liability management system for commercial banks, is available from **Distributed Planning Systems** (16133 Ventura Boulevard, Suite 955, Encino, CA 91436;

213-992-4447): Offers new enhancements as well as a performance improvement averaging 275 percent of the prior version. $3,000.

Δ *The Statistician* contains 100 Fortran subroutines on six disks and is designed to aid the mathematician and scientist in performing daily mathematical functions. Compiled objects and sources on disk. From **Alpha Computer Service** (Box 2517, Cypress, CA 90630; 714-894-6808), the package includes data screening, correlation and regression, design, discriminant, factor, and time series analysis. Requires 128K and IBM Fortran compiler. $295.

Δ **The Association for Women in Computing** (55 Sutter Street, Suite 44, San Francisco, CA 94104; 415-786-1980) is for women interested or involved in the computing industry, from micros on up. Holds regular monthly meetings with speakers and publishes *AWC Source* newsletter. $45 per year.

Δ A full-screen editor, designed as an alternative to IBM's *Edlin* program, has been released by **SoftwareHouse** (6414 Copps Avenue, Suite 138A, Madison, WI 53716; 608-222-3272). *The Text Editor Version 1* has line-by-line and full-page scrolling, and several text-block manipulation functions. $54.95.

Δ An enhanced version of their spreadsheet program is available from **Ashton-Tate** (10150 West Jefferson Boulevard, Culver City, CA 90230; 213-204-5570). *Financial Planner Release 220* interfaces with *dBase II*. $700.

Δ **Peachtree Software** (3445 Peachtree Road N.E., Atlanta, GA, 30326; 404-262-2376) has announced a specially rewritten pc version of its popular *Peachtext* word processor. Now incorporating the function keys, the program also accepts special characters in French, Italian, Spanish, and German. $395.

Δ A trio of *UltraFast* utilities from **Daystar Systems** (10511 Church Road, Suite L, Dallas, TX 75238; 214-341-8136): *UltraTrap* is a parity handler that intercepts and circumvents the one in the BIOS. *UltraBoot* is a dynamic memory allocation program that changes the computer's internal switches from the keyboard. *UltraFast* is a flexible RAM emulator. All three: $39.95.

Δ *Miraculous Menu Manager* allows you to execute with a single keystroke any function the operating system is capable of performing. From **The Computer Workshop** (322 Sheldon Avenue, Houghton, MI 49931; 906-482-8009), the program comes with a set of predefined functions you may keep or replace. $39.95.

Δ A RAM-disk capability that speeds up applications on its Personal Hard Disk has been announced by **Corona Data Systems** (31324 Via Colinas, Suite 110, Westlake Village, CA 91361; 213-706-1505). The added feature allows the disk to rely on system memory instead of disk drives for storing software or data while running programs. Five megabytes: $1,795. Ten megabytes: $2,295.

Δ *PowerSpell* is a spelling checker for use with *PowerText* word processor from **Beaman Porter** (Pleasant Ridge Road, Harrison, NY 10528; 914-967-3504). A base dictionary of six thousand words is expandable up to one hundred thousand using a text file. Dictionaries of up to twelve thousand words will fit on the word processor's boot disk. $125. Δ Version 1.9 of *PowerText* is available, with several new editing features added, including up to seven levels of nested editing that allow you to suspend editing of one file and move to another. It comes with user-definable phrase dictionary. $399.

Δ Hardware update from **Quadram** (4357 Park Drive, Norcross, GA 30093; 404-923-6666): The Quadlink board is the functional equivalent of an Apple II computer and allows Apple software to run on the pc. Load Apple disk and press one key. $680. Δ Prices have been reduced on memory boards. 64K: $350; 128K: $475; 192K: $595. Δ Dual-port RS-232 asynchronous adapter is software- and hardware-compatible with the IBM asynchronous adapter. $129. Dual-port expansion kit: $60. Δ Quadram on-board chronograph eliminates the need to enter current date on bootup. $110. Δ Parallel interface card has standard Centronics connector, pin-out, and timing, with handshaking. $159. Δ Quadscreen is a big-screen hi-res monitor—164 characters wide by 64 lines. $1,950. Δ Quadchrome is a sixteen-color, RGB twelve-inch monitor. $795. Δ The Quadcolor board will allow bit-mapped hi-res of 640 by 200 or 640 by 400 pixels in up to sixteen colors at once. $350 to $850. Δ Interfazer is a 128,000-character that can direct the printing of jobs of up to eight computers. $295.

Δ Version 1.1 of the *Mail Track I* mailing list program is available from **Sapana Micro Software** (1305 South Rouse, Pittsburg, KS 66762; 316-231-5023). Avoid sorting every time you enter; warns you of duplicate entries. $29.95. Update $5. Δ Print form letters with the *LetterMerge* companion disk. Works with any word processor. Free with update.

Δ A 3-D business graphics package that creates vertical bar plots and graphs, contour graphs, scatter charts, and schematics has been announced by **Starside Engineering** (Box 18306, Rochester, NY 14618; 716-461-1027). *DIFmaster* accepts data stored in DIF files created by *VisiCalc* and other popular programs. File-creating utility and modifiable graphics-printer screen dump included. $79.95.

Δ **Insoft** (10175 Southwest Barbour Boulevard, Suite 202B, Portland, OR 97219; 503-244-4181) has introduced *Data Design*, a relational database management system. Features help screens, twenty-six simultaneous indexes (sorted orders), calculated fields with post option, phone communications, and more. $225. Δ An expanded version of the *Accountant* series of integrated accounting software now features automatic service charges, mailing labels, compiling code for increased speed, and more. It's compatible with *Peachtree Series 4*, without file size limitations. $365. Update: $100.

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Δ A computer-aided, self-study training program for developing and improving leadership skills among computer center management and supervisory personnel is available from **Computer Systems Research** (Avon Park South, 40 Darling Drive, Avon, CT 06001; 203-678-1212). *The Data Center Management Series* contains five courses, among them personnel resource management; data center planning and objectives; and budgeting, rate development, and chargeback systems. $1,500 to $2,500 per course module. Complete series: $6,000.

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Δ Software from **Single Source Solution** (2699 Clayton Road, Concord, CA 94519; 415-680-0202): *The Addressor* is a name and address filer system. $39.95. Δ *PCSecurity* is a data file encryption program that uses a multistage encryption for additional security. $99.95.

Δ **Comshare Target** (1935 Cliff Valley Way, Suite 200, Atlanta, GA 30329; 404-634-9553) has announced the *Target Applications Guide*, a book, with a companion disk, that describes generic modeling problems that can be addressed with *PlannerCalc*. Includes a calculation library and a section on more complex application situations. $125.

Δ A six-utility package from **Robert A. Murry and Associates** (9110 Thirty-first Avenue N.W., Seattle, WA 98117), written in BasicA, includes a clock/calendar, an itinerary management program, expense record keeping, and a block letter printing program. Source code unprotected. $49.95.

Δ Combining the best features of mouse, light pen, and bit pad technology, the new input device from **Sun-Flex** (20 Pimental Court, Novato, CA 94947; 415-883-1221) is based on a transparent, on-screen digitizer and a small off-screen digitizer pad. The system is stylus-operated and offers alternative on or off screen cursor manipulation. The four-by-four-inch off-screen pad offers a thousand-by-thousand-point resolution on the active area. Any pixel location can be addressed from the pad. Pad can also be equipped with function keys or menus. $795.

Δ Have up to nine DOS or Basic jobs running at the same time with *Multi-Job*. Switch from job to job with a single keystroke. Requires DOS 1.1. $159. Δ *Memory Disk* converts unused memory into one or two RAM disk drives. Contents of one drive maintained during a reset. Requires DOS 1.1. $59. Δ *Spool Programs* will redirect printing to memory and then feed the data to the printer when it's ready. $24. Δ *Set Memory Size Utility* allows you to set the effective size of memory to any multiple of 1K, up to the actual amount of memory in your machine. $10. All from **B&L Computer Consultants** (7337 Northview, Suite B, Boise, ID 83704; 208-377-8088).

Δ Time-sharing software for resort needs: *The Resort Time Management System* streamlines time-sharing reservation scheduling, dues accounting and billing, member services, mailing lists, and address label printing. From **CRS West** (18740 Pacific Highway, West Linn, OR 97068; 503-635-6651), the system also does accounts receivable and payable, payroll, and general ledger. $12,000.

Δ Version 5.0 is an updated, more sophisticated version of *Chart-Master*, a business graphics program from **Decision Resources** (21 Bridge Square, Westport, CT 06880; 203-227-9567). A new feature is the ability to produce proportional pies for charts; selected slices can be exploded for emphasis. Eight different symbols for producing scatter charts and eight hatching patterns for bar charts have also been added, along with on-screen previewing of charts and more text-handling features. $375.

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Δ Published by **Mentor** (533 Sutter Street, Suite 914, San Francisco, CA 415-387-1318), and devoted to the pc, *Mentor . . . the magazine on disk* consists of a control program that lists text articles and documentation files, as well as standalone programs that can be copied from the distribution disk. The primary emphasis is on programs, procedures, and financial templates compatible with many software products. $19.97 per issue. $99 for six.

Δ Connect Peachtree's *General Ledger* to *VisiCalc*, *Multiplan*, or *1-2-3* with *Peachtree Connection*, communications software from **Sofstar** (13935 U.S. Highway One, Juno Square, Juno Beach, FL 33408; 305-627-5511). Forecasting, budgeting, and modeling capabilities that use your actual accounting data. $95.

Δ Complement relationship banking strategies with *RB3* (relationship banking system), a sales-support system for bank reps to help banks attract, maintain, and upgrade customers into long-term, multiservice clients. From **Infoware** (2407 Twelfth Avenue South, Nashville, TN 37204; 615-385-1515), the package can respond to inquiries about service options, rates, terms. Contains financial calculation programs to help customers make decisions, plan, evaluate, and compare financial actions. One-year lease: $1,995.

Δ *The California 10 Pak* , a package of minilevel aids and tools from **California Software Products** (525 North Cabrillo Park Drive, Suite 300, Santa Ana, CA 92701; 714-973-0440), contains such functions as browse, sort, pattern selection, memory mapping, hex/alpha display, and screen-browsable decoding of absolute disk areas. It also contains on-screen help facilities and multiple window display. Either DOS. $100. Δ Transfer IBM System/34 procedures to the pc with *Baby/34*, a collection of processors, routines, and utilities, including a System/34 operational control language processor, System/34-compatible RGPII compiler, runtime execution package, and a source entry utility. $2,500. Execution package: $595.

Δ *The Insecticide Game* is an arcader from **Bel-Air Software,** the game-producing half of **Cortland Data Systems** (Box 14414, Chicago, IL 60614; 312-929-7727). Either monitor. $34.95.

Δ A line of voltage surge supression products is marketed by **Panamax** (150 Mitchell Boulevard, San Rafael, CA 94903; 415-472-5547). A two-stage transient clamping device is shunt-fed, allowing it to protect 120 VAC loads at any power level. Units can handle from one to six devices. $55 to $109.

Δ A family of fully supported relational database management, office automation, and Cobol packages running under Xenix has been released by **The Santa Cruz Operation** (500 Chestnut Street, Box 1900, Santa Cruz, CA 95061; 408-425-7222). *Informix* provides the data management. Δ *Ace* produces formatted reports. Δ *Perform* is a data entry and enquiry system. Δ *Uniplex* is the office automation system and includes word processing. Prices to be announced.

Δ An RGB interface for use with Sony Profeel Monitors provides a sixteen-color display and supports an eighty-by-twenty-five-character text; it's available from **Telemax** (780 Lorraine Drive, Box 339, Warrington, PA 18976; 215-343-3000). The interface includes eight-inch cable assembly with mating connectors. $99. Δ A video-activated power switch to turn monitors off and on saves electrical energy by using monitor display only when signal is present. $99.

Δ Three stock market analysis programs from **N-Squared Computing** (5318 Forest Ridge Road, Silverton, OR 97381; 503-873-5906): *Market Illustrator* contains one disk for charting stocks and commodities and one for split-screen displays that enables users to compare data with program-generated indicators. $195. Δ *Market Analyzer* provides a total manipulative capability to create and compare complex indicators. Contains single-keystroke functions. $295. Δ *Stock Analyzer* incorporates all major technical analysis functions for the detailed study of individual stocks. Includes high, low,

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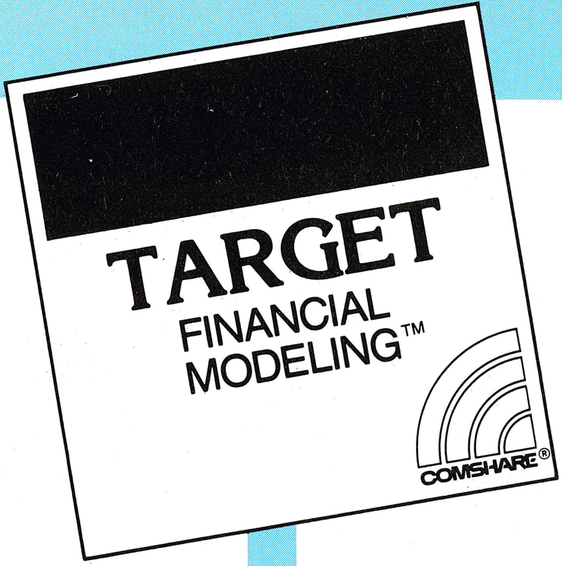

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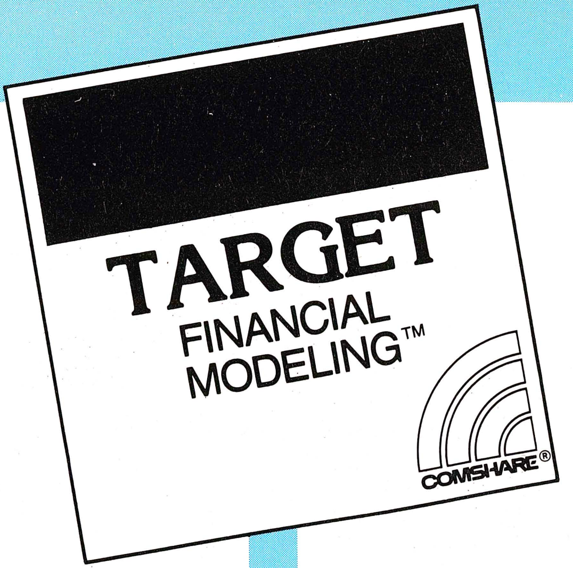

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LINE 2 PRICE = 10, GROW BY 5%
LINE 3 REVENUE = UNITS * PRICE
Instead of the following Calc-type language:
► A1              ► A2              ► A3
" UNITS           " PRICE           " REVENUE
  5000              10                B1 * B2
  5500              B2 * 1.10         /R B3:C3 . . . D3
  6000              /R C2:D2 . . . D2
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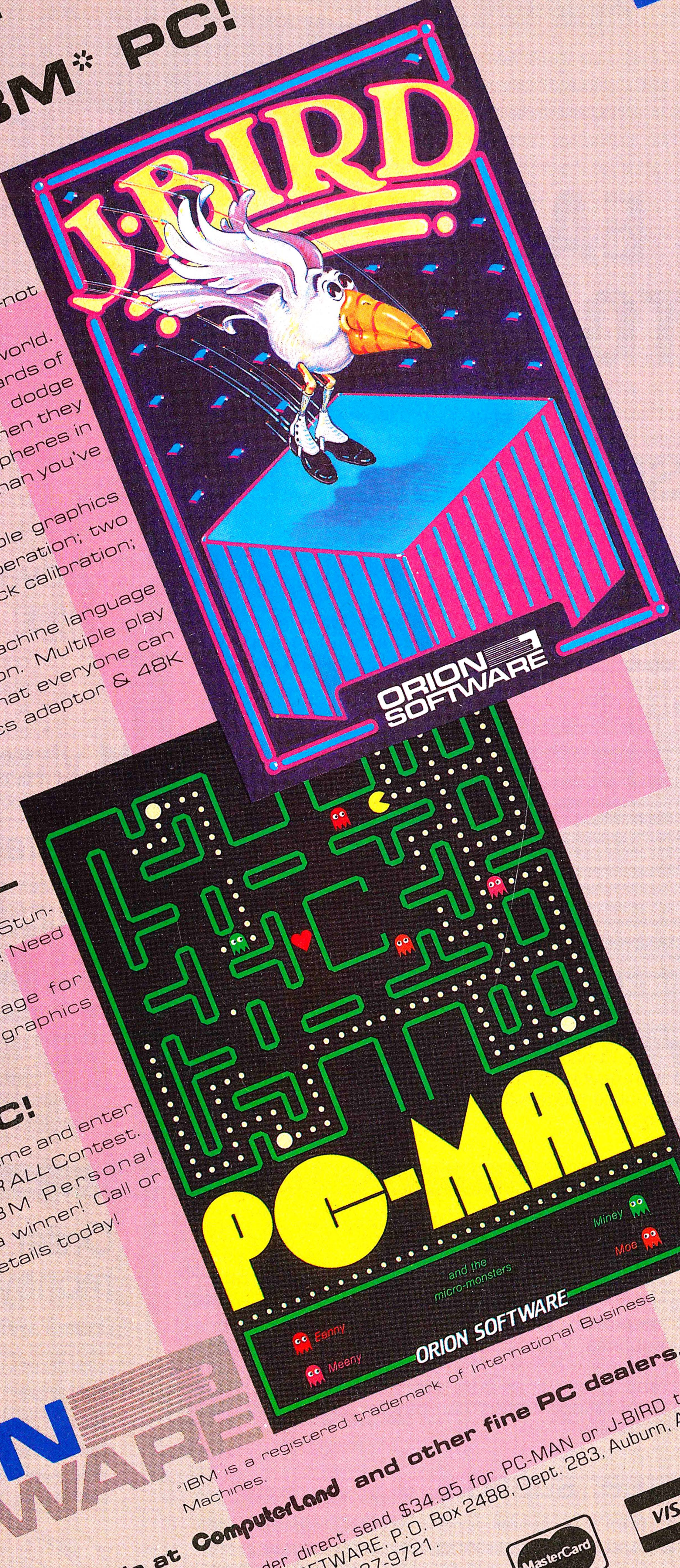

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and close-volume displays, momentums, averaging, and point and figure charting. $295.

Δ *Computers: A Comprehensive Guide* is the latest mail-order catalog published by **Yes!** (1035 Thirty-first Street N.W., Washington, D.C. 20007; 202-338-7874). The sixty-four-page annotated bibliography contains short, critical reviews of over eight hundred of the best microcomputer books published to date. Arranged by topic, including artificial intelligence, languages, hardware, computers and society, and twenty-two more. $2.

Δ *The 1983 Summer Consumer Electronics Show* will be held at McCormick Place in Chicago June 5-8. Exhibits, workshops, conferences, and seminars are planned. Sponsored by **Consumer Electronics Shows** (233 Illinois Center, Suite 1607, 233 North Michigan Avenue, Chicago, IL 60601; 312-861-1040). Admission is free.

Δ *Useful Basic Programs for the IBM PC* is a book of sixty ready-to-run programs for the novice who wants to get right down and compute. No knowledge of flow charts or Basic needed. Published by **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233). $8.95.

Δ *The PC Modem Speed Adapter* will increase the baud rate of the *PC Modem Plus* to 1200 baud, according to **Ven-Tel** (2342 Walsh Avenue, Santa Clara, CA 95051; 408-727-5721). $360.

Δ Investment software from the bookmakers **John Wiley & Sons** (605 Third Avenue, New York, NY 10158; 212-850-6000): *Personal Investment Analysis* takes the place of a personal investment adviser, offering immediate access to information to perform analysis in five key categories. $60. *Buy or Lease? A Financial Decision Maker* minimizes the risk of buy-or-lease decisions. Evaluates costs involved. $125. Δ *Investment Tax Analyst* is a program for accountants, stockbrokers, financial planners, and individual investors who need to quickly analyze the tax implications of different strategies. $150.

Δ Set up a dot-matrix printer using five sizes of print, seven line spacings, slashed or plain zeros, elongated print, and more with *PCP* (printer control program) from **Pro/Pac** (14925 Memorial Drive, Suite 105, Houston, TX 77079; 713-496-1179). $24.95.

Δ News from two divisions of **IBM**: **Customer Service** (400 Parson's Pond Drive, Franklin Lakes, NJ 07417; 201-848-4203) announces a new maintenance agreement option providing on-site pc and XT service in thirty-eight cities. Annual term and warranty extension term rates (pc only) for courier pick-up, carry-in, and mail-in have been reduced 10 to 18 percent, depending on configuration.

Δ **System Supplies** (Box 10, Princeton, NJ 08540; 201-329-7000) announces a compact, multifunction, mobile Synergetix Work Station with a swing-out cabinet that provides storage space for most hardware components and support materials. The station can be unlocked to open into a self-contained work area, providing easy access to printer, paper, and support materials, as well as to the central unit, monitor, and keyboard. For security, wiring is concealed within the ergonomically designed unit. $745 to $850.

Δ For accountants, attorneys, insurance agents, and financial planners, Version 2.0 of *Estate Tax Plan* is available from **Aardvark Software** (783 North Water Street, Milwaukee, WI 53202; 414-289-9988). Requires two disk drives. $750.

Δ Lively hi-res realism highlights *Space Miner*, a shoot-'em-up arcade game from **Resolution Software** (8 Edgewood Boulevard, Providence, RI 02905; 401-461-2417). Players maneuver a fleet of space mining ships to collect chunks of mineral ore by activating a robot claw. Requires color/graphics adapter. $29.95.

Δ *L.I.F.E. Goals* helps professional financial planners prepare custom financial plans for clients. From **Kinnaird Soft Plans** (2953 N.E. Brogden Street, Hillsboro, OR 97123; 503-640-2875), the package prints eighteen to twenty-six pages of explanation and analysis of present and proposed financial situations. Requires *SuperCalc*, *WordStar* with *MailMerge*, and two disk drives. $945.

Δ Version 2.0 of *FileMaster*, the data management system from **N.F. Systems** (Box 76363, Atlanta, GA 30358; 404-252-3302), can generate reports sorted in ascending or descending order using up to eight fields, and more. Requires 96K. $125. Δ Release 1.10 of *HostComm* is also available. Features of the program include the capability to upload and download ASCII files and run programs on your computer from a remote location. Three-level password controls all access. Requires 128K, modem, and asynchronous adapter. $170. Δ *HostComm Utilities I* and *II* contain seven routines that help the system operator use the power of the system more effectively. $49.95 each. Δ *OrderTrans* lets the user provide information about a company's products, using *HostComm*, to prospects and clients. Information is contained in a modifiable file. $39.95. Δ *PCE Mail* allows *HostComm* users to leave messages and correspond with other users. $80. Δ The *Electronic Conferencing System* works like a bulletin board. $80.

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Δ *The Next Step* from **Execuware** (Intercontinental Plaza, Suite 300, Box 10, 7415 Pineville-Mathews Road, Charlotte, NC 28211; 704-541-1199) provides the business manager with special editing capabilities, customized help screen, and easy data organization and retrieval for report generation. $295. Δ *Know Your Client* is a business file information system. $92.95. Δ *Financial Analysis* contains lease-versus-buy analysis, depreciation schedules, and IRR, NPV, and PV calculations. Requires printer. $92.95. Δ *E.O.Q.* determines economic order, quantity, and order point when asked. Also does "what if?" calculations. $92.95 Δ *Real Estate Analysis Package* does

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Also, it generates a per serving calorie counter. This is easy to delete anytime you are not in a diet mood or want to celebrate for any reason. You never count calories unless you want to.

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Say goodby to boring meals. Your computer will remember variety is the spice of life. This system makes eating at home a pleasure again. Each menu is randomly generated from major food groups according to the specific criteria you select. The system is easy to learn and easy to operate. Yet it is a sophisticated piece of software which will prevent menu mix-ups.

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OUT OF THE RUT

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long-range planning, determines tax advantages, and can store fifteen modifiable investments on disk. Requires printer. $149.95.

Δ **Berzurk Systems** (1434 Parker Street, Berkeley, CA 94702; 415-658-2917) has released *Spell-It*, a spelling checker with three dictionaries: a 41,000-word main dictionary; a dictionary of proper names and places; and a dictionary of contractions. Requires 96K for DOS 2.0, two disk drives, and eighty columns. $29.95.

Δ *The International Institute on Microcomputers in Education* is an intensive five-week institute for educators, researchers, and administrators from around the world. Held at Stanford University in California, June 27 through July 29, the institute offers computer-using skills, an overview of micro technology, realistic strategies for coping with computing opportunities, and more. Sponsored by the **Stanford School of Education** and **Interactive Sciences** (216 School of Education, Stanford University, Stanford, CA 94305; 415-497-6420). May be repeated in August. $1,686 per person.

Δ Details of four hundred software packages available in Britain for the pc are contained in the first issue of *PC User*, a directory on disk, and its companion printed version. Published by **EMAP Business and Computer Publications** (Durrant House, 8 Herbal Hill, London, EC1R 5BJ; 01-837-3699). Free. Contact your dealer.

Δ Construction management and graphics software from **Rambow Enterprises** (7-480A I Street, Elmendorf AFB, AK 99506; 907-753-2291): *Construction Estimating* allows estimator to input each item, quantities, labor, and unit cost directly from the take-off sheets. Computer does all calculations. Requires eighty columns. $300. Δ *Job Costing—Residential Construction List*, based on standard banking loan forms, allows one hundred cost categories during construction, fourteen categories after costs, and more. $500 Δ *Auto Parts Inventory* is designed to track auto parts based on manufacturer's number, part title, or entry number. $400. Δ *Quick Draw* allows the cursor control keys to draw extensive graphics on a monitor for use in other programs. Medium and hi-res. $45. Δ *Plotter Driver for Houston Instruments DMP-7* allows the plotter to be controlled by the pc. Requires RS-232 interface card and plotter. $50. Δ *Graphics Screen Dump* will take any graphics display that has been *bsaved* and dump it to an Anadex DP9501 printer. Requires parallel printer interface card, graphics card, and printer. $30.

Δ Equipment or program malfunction and data loss due to operator-generated static discharge is solved using *WattsOut*, a small antistatic pad that attaches to the keyboard, from **WattsOut** (2020 Oneida, Suite 201, Denver, CO 80224; 303-759-3880). Never needs to be replaced. $9.95.

Δ All files, regardless of type, can be transferred to cassette for backup with *Archives V*, a utility program from **Indiana Digital** (Box 3755, South Bend, IN 46619; 219-288-7280). Specify memory size when ordering. Requires 1.0 or 1.1. $39.95.

Δ Try your hand at being an artist with *ES Painter*, a simple drawing utility from **E & S Software Services** (Box 238, Bedford, MA 01730; 617-275-8534). Operates with function keys; sixteen colors available. *ES Picture I*, a companion disk for children, contains nine predrawn pictures. Requires color/graphics adapter, joystick, and DOS 1.0 or 1.1. $45.

Δ A forty-two page coding guide for programming in Basic has been released by **Associated Technology** (Route 2, Box 448, Estill Springs, TN 37330; 205-837-4718). The guide provides an easily applied method that insures the construction of top-down programs that are structured, testable, and easy to maintain. $22.

Δ *Micro Software Distributors: A Sourcebook for Publishers Seeking New Markets* is a directory listing more than 150 companies actively seeking programs for resale. Included are hardware manufacturers, software and mail-order houses, book publishers, and more. Published by **Software Research** (4525 Twenty-eighth Street, N.W., Washington, D.C. 20008; 202-364-8700). $95. ▲

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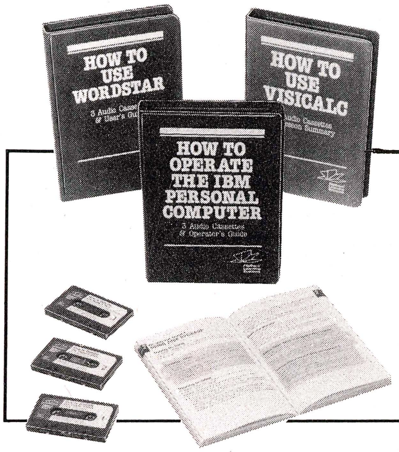

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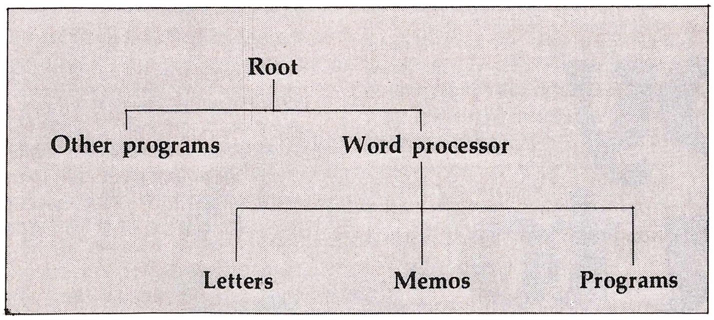
SYSTEM NOTEBOOK

by Alan Boyd

As we saw last month, it is usually beneficial to group disk files in different directories according to the nature of their contents. For instance, a parent directory could hold a word processor, with three subdirectories devoted to different types of files created by the word processor—maybe letters, memos, and program listings. This type of structure can expedite such tasks as backing up files.

The surest way to grasp hierarchical directory structures is to use them, so fire up your pc and let's get started. The first thing we should do is create the directory structure we talked about above: a word processor with three subdirectories. The final structure will look like this:



Let's assume we have created five program listings—Code1.src, Code2.src, Code3.src, Code4.src, and Menu.cde—and that they are in the directory specified by the pathname \WP\Programs. Just so things don't get too easy, the last program is named deliberately so as to complicate matters when using DOS's wildcard characters. Such a complication is fairly realistic, however, since integrating older files with different naming conventions into more recent programs is a fairly common occurrence.

We'll step through the process of creating this directory structure, and then see for ourselves how DOS's new abilities add power and flexibility to file manipulations.

First, format two blank disks using DOS 2.0's *format* command. Don't worry for now about changes to the *format* command; simply use the default version of the command (*format b:*) and let DOS determine the type of disk drives you have (single- or double-sided, eight- or nine-track) and format the blank disk accordingly. Place one of the disks in drive A, the other in drive B, and then log onto drive B in the usual manner.

Now enter a *dir* command. The directory you see is called the root directory. This top-level directory is created by the *format* command; it is the directory you automatically log onto when you first place a disk in the drive. You will stay logged onto the root directory until you tell DOS to move to another directory. Your *dir* should have returned something like this:

```
B>DIR
 Volume in drive B has no label
 Directory of B:\
 File not found
```

This is the usual blank root directory DOS 2.0 creates when it formats a disk. Now let's create two subdirectories under the root directory: one to hold our word processor and the other for everything else. Let's call them WP and Other. To create them, enter:

```
B>MKDIR OTHER
        (which MaKes a new subDIRectory called Other)
B>MKDIR  WP
        (which makes a new subdirectory called WP)
```

When you issue the *dir* command you will see that DOS has two subdirectories on the root directory. The root directory should look something like this:

```
B>DIR
    Volume in drive B has no label
    Directory of B:\
     OTHER          <DIR>      6-01-83   12:41a
     WP             <DIR>      6-01-83   12:41a
            2 File(s)  165376 bytes free
```

Now let's create the three subdirectories—sub-subdirectories, actually—under the subdirectory WP. There are two ways we can create these subdirectories, and we'll use both. The first method is to issue another *mkdir* command while we are logged onto the root directory. We'd better specify the full pathname of our new (sub-) subdirectory, however, or DOS will simply create a new subdirectory on the root. To create the directory *Letters* under WP, we would specify the pathname as \WP\Letters. That first backslash (\) signifies that our pathname is starting at the root directory. But since we're already logged onto the root, we can drop that \, and simply issue the command

```
B>MKDIR WP\LETTERS
```

DOS Verification. To verify that DOS has indeed created the subdirectory Letters under the subdirectory WP, let's move down the hierarchy one level to the WP directory

```
B>CHDIR WP   (which CHanges the working DIR to WP)
```

and then issue a directory command:

```
B>DIR
    Volume in drive B has no label
    Directory of B:\wp
    .               < DIR >    6-01-83   12:41a
    ..              < DIR >    6-01-83   12:41a
    LETTERS         < DIR >    6-01-83   12:43a
           3 File(s)   165376 bytes free
```

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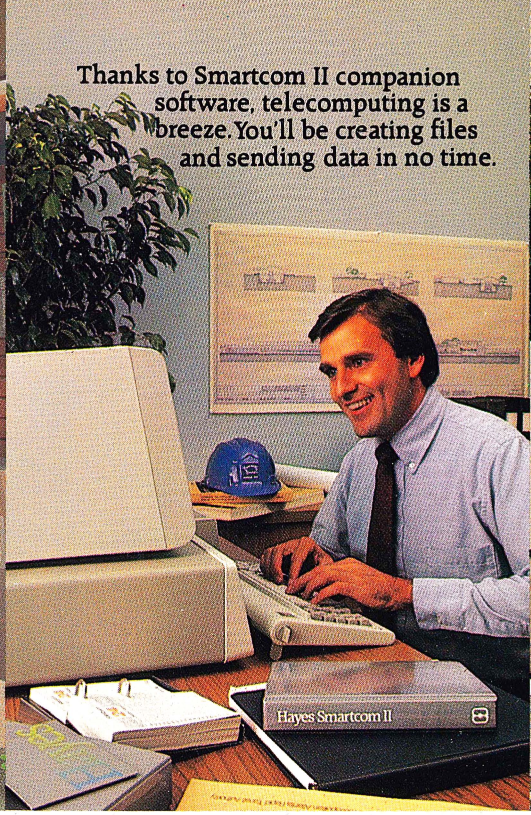

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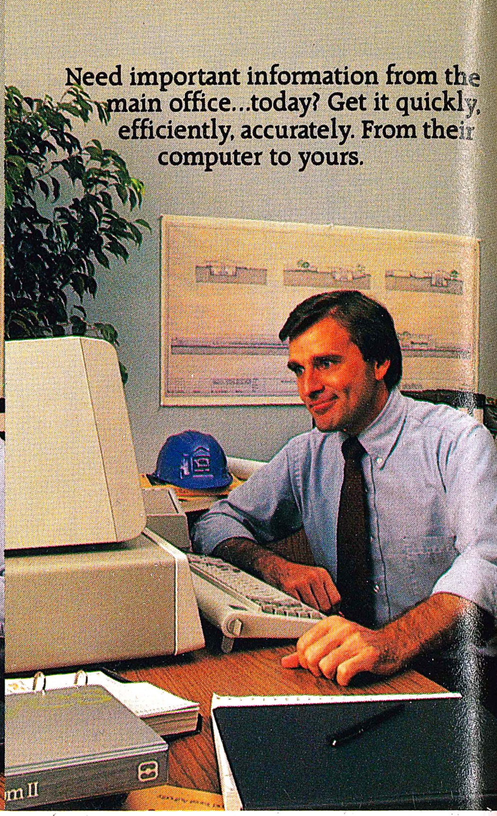

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Requires an IBM PC with minimum 96K bytes of memory; IBM DOS 1.10 or 1.00; one disk drive; and 80-column display. No serial card or separate power source is needed.

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You can see that DOS has created both the new subdirectory Letters with the pathname\WP\Letters, and the two standard overhead directory files dot (.) and double dot (..).

The second method of creating a subdirectory is to log onto the parent directory; then we can issue a *mkdir* command using a relative pathname. Since we have just logged onto the\WP directory—which is the parent of the directory we wish to create—we can create a subdirectory of it by simply saying:

```
B>MKDIR MEMOS
```

Again, the disk spins and DOS creates another subdirectory, as a quick look at the parent directory will verify:

```
B>DIR
     Volume in drive B has no label
     Directory of B:\wp
      .               <DIR>      6-01-83   12:41a
      ..              <DIR>      6-01-83   12:41a
      LETTERS         <DIR>      6-01-83   12:43a
      MEMOS           <DIR>      6-01-83   12:44a
              3 File(s)   165376 bytes free
```

So far, we have created one directory by starting at the root and using an absolute pathname and a second directory by starting at the parent and using a relative pathname. For our third subdirectory, let's start out by logging onto a completely different directory—Other—and creating a subdirectory under WP while logged onto the directory Other. (If this is all starting to sound a little muddy, it might be helpful to refer back to the diagram (on page 56) of the structure we're creating. To log onto the Other subdirectory, we can back out of the\WP directory and move up to the root with the command

```
B>CHDIR ..
```

which pops us up to the parent directory—which in this case is the root. From here we can log onto the Other subdirectory

```
B>CHDIR OTHER
```

We are now logged onto the directory at the pathname\Other, and we would like to create a directory with the pathname \WP\Programs without changing our position on the tree structure. We can do this simply by using the *mkdir* command with an absolute pathname; when DOS is given an absolute pathname, it resets itself to the root and follows the path downward from there. The command to use is

```
B>MKDIR\WP\PROGRAMS
```

To see the results of our handiwork, we could move directly to the\WP directory

```
B>CHDIR\WP
```

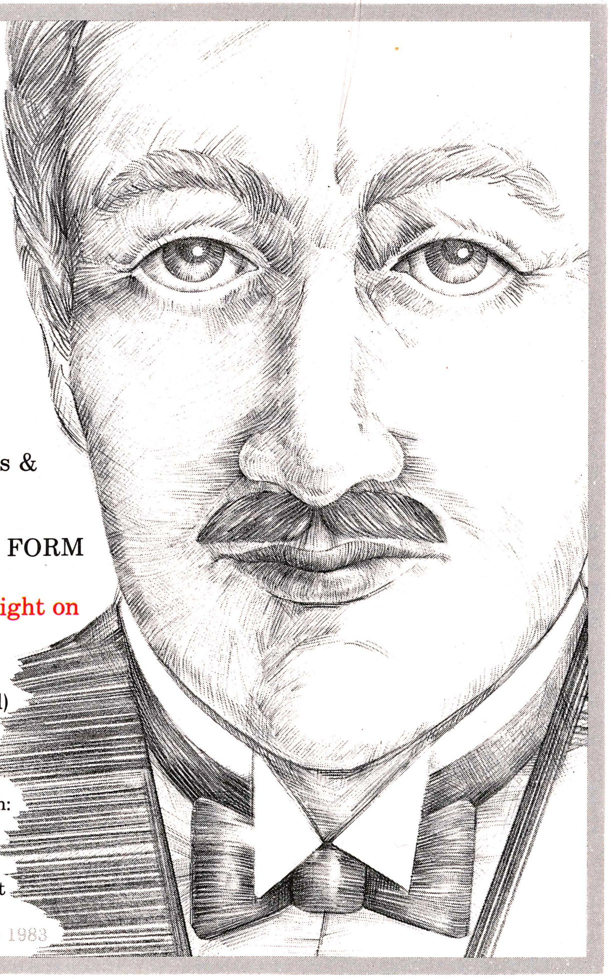
and then request a directory listing:

```
B>DIR
     Volume in drive B has no label
     Directory of B:\wp
      .               <DIR>      6-01-83   12:41a
      ..              <DIR>      6-01-83   12:41a
      LETTERS         <DIR>      6-01-83   12:43a
      MEMOS           <DIR>      6-01-83   12:44a
      PROGRAMS        <DIR>      6-01-83   12:45A
              5 File(s)   165376 bytes free
```

At this point we have created the complete directory structure shown in our diagram; all that is left to do is the creation of some dummy files to play with. First let's create a set of files under the \WP\Programs directory. Log onto that directory

```
B>CHDIR PROGRAMS
```

A quick directory listing should prove that, other than the two



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housekeeping files created by DOS, the directory is empty. We will rectify that little problem by creating several dummy files that will represent the source code files we mentioned earlier. Let's use the old standby:

```
COPY CON: filename
```

Create the first dummy file, Code1.src, by entering

```
COPY CON: CODE1.SRC
```

and bang out some junk on the keyboard. When you have entered several lines, enter the end of file marker by hitting either the F6 special function key, or control-Z (∧Z). Now use the *copy* command to create several files with different names, thereby giving us something to look at when we list the directory. When you are done, the directory listing should look something like this:

```
B>DIR
   Volume in drive B has no label
   Directory of B:\wp
    .                <DIR>     6-01-83   12:41a
    ..               <DIR>     6-01-83   12:41a
    CODE1     SRC     117      6-01-83   12:46a
    CODE2     SRC     117      6-01-83   12:46a
    CODE3     SRC     117      6-01-83   12:46a
    CODE4     SRC     117      6-01-83   12:46a
    MENU      CDE     117      6-01-83   12:46a
           7 File(s)    165376 bytes free
```

Now let's put something in our word processor (\WP) file. We can use the *copy* command again, this time copying our dummy file from the child to the parent directory. The generic form of the *copy* command when used in such cases is:

```
COPY pathname\filename pathname\filename
```

File Specification. Notice that in DOS 2.0, the entire pathname is delineated from the filename not by a colon (:) but by a backslash (\), since the filename is considered part of the full pathname. The pathname need not be entered if it is the same as the default or current pathname; on the other hand, it's always legal to enter an absolute or relative pathname. In this case, this means that there are several ways to specify our files to the copy command. Specifying the pathname absolutely

```
COPY  \WP\PROGRAMS\CODE1.SRC
      \WP\WORD.COM
```

is probably the clearest method, although it's also a bit tedious. Since all information is explicitly given, this absolute format can be used regardless of what directory we are currently logged onto.

Another way to specify the command would be

```
B>COPY CODE1.SRC \WP\WORD.COM
```

Here the first argument is relative, since the entire pathname is not specified. DOS assumes that the file is located on the currently logged directory. As before, an absolute pathname is given for the second argument.

Another version makes both arguments relative:

```
B> COPY CODE1.SRC ..\WORD.COM
```

The .. means back up one level to the parent directory; since we are currently logged onto \WP\Programs, the parent directory is \WP, which DOS uses to form the pathname for the destination file. By similar reasoning, if we had wanted to copy the file Code1.src onto the root directory, we could have said either

```
B>COPY CODE1.SRC \
```

or

```
B>COPY CODE1.SRC ..\..
```

In the second example, since we are two levels down from the root directory, we use the double period notation twice.

In neither of the above examples was the destination filename specified—as with DOS 1.1, the newly created file will be given the same name as the source file. But notice the difference here between DOS 1.1 and DOS 2.0: In version 1, it is not possible to have two files of the same name on the same disk. That's no problem with 2.0, however, as long as the pathnames are different.

Okay, we've created a hierarchical directory structure like the one in the diagram, and we've seen how the *copy* and *dir* commands behave when used with such directory structures. Now let's look at how some of the other commands behave in our new environment and at the rules that govern them.

First, though, log onto drive A and create one more subdirectory—let's call it Test.

```
B>A:
A>MKDIR TEST
```

Now log onto Test

```
B>CHDIR TEST
```

When that's done, make sure that your current directory on B is still \WP\Programs. You can check this by typing *dir b:* and verifying the pathname. If your current directory on B is not \WP\Programs, you can change it without logging onto B by typing

```
A> CHDIR B:\WP\Programs
```

This will not affect the directory on the logged drive.

Swap Along with Me. . . . Now switch the two disks. That's right, physically remove each disk and put it in the other drive. Take a look and see which directories you're now logged onto. DOS behaves reasonably here: Whenever version 2.0 finds that a disk has been changed, it resets its position in the tree to the root.

Swap disks again and once more set up the scenario where the active directory in drive B is \WP\Programs and you are logged onto drive A, where the active directory is Test. Now remove the disks and place the disk that was in A into B. Take a look at the directory of B; notice that you are given a listing of the root directory. Remove this disk and put it back in the A drive; if you list the directory of A again, you will see that you are still logged onto \Test. That makes sense, since there were no disk operations between the time you removed the disk and the time you reinserted it. Now re-

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place the disk that you removed from drive B; because we changed disks in B since the last disk operation, DOS should have reset the current directory to the root directory.

By now, you're probably nonchalantly climbing up and down hierarchical tree structures, so let's move on to some other topics that should give you an even better feel for how DOS 2.0 works. Take the disk you created with the dummy files and put it in drive A, and place the DOS 2.0 distribution disk (or better yet, a copy of it) in drive B. Don't worry if you haven't backed it up yet, however—the rest of this example explains how to do exactly that.

Suppose we wanted to copy the Diskcopy.com file from the DOS disk to our play (drive A) disk. Suppose also that we wanted to put it in the directory \Other, giving it the absolute pathname \Other\Diskcopy\Diskcopy.com. Again, there are a few alternative ways of skinning the cat. The simplest is to change the current directory of drive A to the \Other directory

```
A>CHDIR \OTHER
```

and then issue the command

```
A>COPY B:DISKCOPY.COM A:
```

Since the command does not specify a target directory, the file will be written onto \Other, the currently logged directory.

There's an easier way of copying the file, and that is to specify the absolute pathname of the destination file. Doing that, we don't need to log onto the \Other directory, so the whole procedure could have been done with the single command

```
A>COPY B:DISKCOPY.COM \OTHER
```

You can verify that the copy was successful by looking at a directory listing of \Other; simply enter

```
A>DIR \OTHER
```

Now let's use the *diskcopy* command to copy the entire disk we have just created. Remove the DOS disk from drive B and replace it with the second disk you formatted earlier. Make sure you are logged onto drive A, and reset the logged directory to the root by typing CHDIR \.

Even though we know that the *diskcopy* command is not located in the root directory, issue the command

```
A>DISKCOPY A: B:
```

anyway. Well, the "Bad command or file name" message that DOS returns is no surprise. You now know how a poorly set-up hierarchical file structure can become very clumsy: Wouldn't it be tedious if we were working in the \WP directory and had to change directories every time we wanted to access a DOS (or other) utility in the \Other directory?

Fortunately, DOS provides a very simple mechanism for copying with this situation. The way out of this sloppiness is via the use of another new DOS 2.0 command, *path*. The *path* command is used to tell DOS which paths it should search to find a command (or batch file) that is not in the current directory. In our example, we can use the *path* command to tell DOS that if it can't find a command in the logged directory, it should look in the \Other directory. We can do this by entering the command

```
A>PATH  \OTHER
```

Now try to run the *Diskcopy* utility by entering the command again. This time, DOS can find the command, and the disk will be copied. Go ahead and make a backup copy of the play disk, verifying for yourself that the directory hierarchy is preserved on the duplicate.

As you can see, the function of the *Diskcopy* routine hasn't changed under DOS 2.0; an identical copy of the source disk was created.

Alternative Paths. Let's see what else we can do with the *path* command. Log back onto drive A, and replace the disk in drive B with the DOS distribution disk. Make sure that you are logged onto the root directory in drive A, and then create another new directory, called—let's be original—Test. Now copy the Chkdsk.com file from the DOS disk to the newly created directory:

```
A>COPY B:CHKDSK.COM  \TEST
```

Just in case you're still not entirely lost, let's make things more complicated by logging onto the \WP\Programs directory on drive A, and issuing the *chkdsk* command. Again, the "Bad command or file name" error message comes up. No problem, though, now that we've discovered the *path* command; we'll just issue the command

```
A>PATH  \TEST
```

Now when we enter the *chkdsk* command the results will be a little more satisfying.

When you are finished with the *chkdsk* command, reissue the *diskcopy* command. Since we changed the search path from \Other to \Test, DOS can't find Diskcopy.com, which is in the \Other directory. Wouldn't it be nice if we could set multiple search paths on a disk? Well, we can. All we have to do is specify a list of different pathnames to be searched. In our case, the command would be:

```
A>PATH \OTHER;\TEST
```

Notice that pathnames—in this case \Other and \Test—are separated by semicolons. Pathnames can include disk drive identifiers (A:, B:, for example), so several paths can be set on more than one disk. If you are using a fixed drive and several floppies, for example, you could create an Autoexec.bat file specifying all directories containing commands or batch files, and then forget about the problem.

One of the useful facilities of the *path* command is its ability to identify the currently selected paths: Simply enter the command *path* with no arguments and DOS will display the currently selected paths.

Way back at the beginning of this installment, we were discussing the backing up of directories. The filenames in \WP\Programs, our sample directory, do not lend themselves to being specified via the wildcard character method. DOS 2.0 can come to our rescue, however, with some useful features that let us treat whole directories as files.

One of these features is the provision to copy all of the files in a directory simply by copying the directory. Using our example, we can log onto the root directory and issue the standard *copy* command, specifying not a filename (like Code1.src or Code2.src), but the pathname of the directory containing those files. Try it by issuing the command:

```
A>COPY \WP\PROGRAMS B:
```

DOS will respond by going into the directory and copying each of the files it listed there. You should see messages like the following:

```
A>COPY \WP\PROGRAMS B:
A:\WP\PROGRAMS\CODE1.SRC
A:\WP\PROGRAMS\CODE2.SRC
A:\WP\PROGRAMS\CODE3.SRC
A:\WP\PROGRAMS\CODE4.SRC
A:\WP\PROGRAMS\MENU.CDE
```

You might also notice that DOS copies each of the files into the directory on drive B that is currently logged, following the normal set of default rules. Had we wanted to place the copied files into a different directory on the target disk, we could have specified the directory name in the command.

In our case, since we have two disks with the same hierarchical directory structures, we could copy the files to their counterpart directory on the target disk. Enter the command:

```
A>COPY \WP\PROGRAMS B:\WP\PROGRAMS
```

which would do the trick.

Stay with it: If you've managed to hang in there up to this point, you should have a pretty good understanding of the intricacies of tree-structured directories and the new rules that DOS uses to manage them. There are only two more commands to manage tree structures—we'll deal with them in a (shorter) discussion next month. ▲

THE BASIC SOLUTION

BY JOE JUHASZ

Here is a little routine that should be included in all programs that are meant to run on either the monochrome adapter or the color/graphics adapter. The routine determines which adapter the user has; if both adapters are available, the user is asked to choose. The routine then switches to the chosen adapter.

The variable Bufadr is also set. Bufadr can then be used in *def seg* statements or by

---

```
110             '*************************************
120             '*** C H O O S E  &  S W I T C H ***
130             '***         M O N I T O R S        ***
140             '*************************************
150 '
160 '*** INITIALIZATION ***
170  TRUE=-1: FALSE=0
180 '
190 '*** find out which adapters exist ***
200  DEF SEG=&HB000                    '-point to monochrome adapter
                                         memory
210   POKE 0,&H33                      '-set byte 0 to &H33
220   MONO = (PEEK(0)=&H33)            '-test for &H33, if so then
                                         MONO is true
230   POKE 0,&H55                      '-set byte 0 to &H55
240   MONO = (PEEK(0)=&H55) AND MONO '-test for &H55, if so then
                                          MONO is true
250  DEF SEG=&HB800                    '-point to color adapter memory
260   POKE 0,&H33                      '-set byte 0 to &H33
270   KOLOR = (PEEK(0)=&H33)           '-test for &H33, if so then
                                         KOLOR is true
280   POKE 0,&H55                      '-set byte 0 to &H55
290   KOLOR = (PEEK(0)=&H55) AND KOLOR  '-test for &H55, if so then
                                          KOLOR is true
300  IF MONO AND KOLOR GOTO 380        '-if both go ask which one to use
310  IF KOLOR GOTO 470                 '-only color graphics adapter
                                         available
320  IF MONO GOTO 540                  '-only monochrome adapter
                                         available
330 '
340 '***--if we reach here then we have a problem--***
350 CLS: LOCATE 1,2,0: PRINT "SOMETHING WRONG—NO
    ADAPTERS.."
360 END
370 '
380 '*** both adapters exist, ask which one ***
390  CLS: BEEP: LOCATE 1,2,0: PRINT "Choose a display . . ."
400   LOCATE 4,2,0: PRINT "C for color, M for monochrome"
410   I$=INKEY$: IF I$="" GOTO 410     '-wait for a key
420   IF I$="C" OR I$="c" GOTO 470     '-if choose color then go ...
430   IF I$="M" OR I$="m" GOTO 540     '-if choose monochrome then
                                         go ...
440  GOTO 390                          '-bad choice, try again
```

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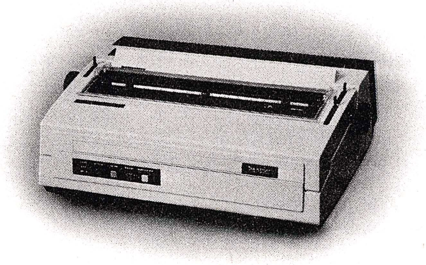

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```
450 '
460 '*** switch to color graphics adapter ***
470   DEF SEG=0: I=PEEK(&H410): POKE &H410,(I AND &HCF) OR &H20
480   WIDTH 40: LOCATE ,,0,6,7
490   KOLOR=TRUE: MONO=FALSE: BUFADR=&HB800
500   COLOR 7,1,1
510 GOTO 590
520 '
530 '*** switch to monochrome adapter ***
540   WIDTH 40: DEF SEG=0: I=PEEK(&H410): POKE &H410,I OR &H30
550   WIDTH 80: LOCATE ,,0,12,13
560   KOLOR=FALSE: MONO=TRUE: BUFADR=&HB000
570   COLOR 7,0
580 '
590 '*** setup screen ***
600   SCREEN 0,1: CLS
610   LOCATE 1,1,0
620 '
```

Here are the changes:

```
470  LINE.NR! = VAL (LEFT$(ST$,IX-1))   '-now using single precision
480  PRINT LINE.NR$;
485  LINE.NUM = LINE.NR! - 32768         '-change to an integer

1730  LPRINT " ";CVI(F1$)+32768;CVI(F2$)+32768;CVI(F3$)
       +32768;CVI(F4$)+32768
1740 LPRINT CVI(F5$)+32768;CVI(F6$)+32768;CVI(F7$)+32768;CVI(F8$)
       +32768;CVI(F9$)+32768
1780 LPRINT VAR.REF(I.PTR,I2)+32768;
```

assembly programs that need to know the memory address of the appropriate screen buffer.

A reader sent in a useful modification to the Basic Cross Reference program that was featured in this column in February. You may recall that the program was unable to cross-reference programs with line numbers in excess of 32,768. The modified version will allow cross-referencing of all Basic line numbers.

The earlier limit of 32767 stemmed from the fact that the cross-referencer uses integer variables to hold the target program's line numbers. Integer variables in Basic are much faster to manipulate and require much less storage than do real numbers; because of storage and processing constraints it was necessary to use integers.

Since line numbers must be positive, the set of integer values from −32768 to 0 are not used by the original cross-referencer. The modified version, in line 485, subtracts 32,768 from each of the target program's line numbers, in order to make use of those negative values. At printout time— in lines 1730, 1740, and 1780—the modified version adds 32,768 to the line numbers to get the original values back.

Our thanks to Ronald Dorchester of San Antonio, Texas, for this modification. ▲

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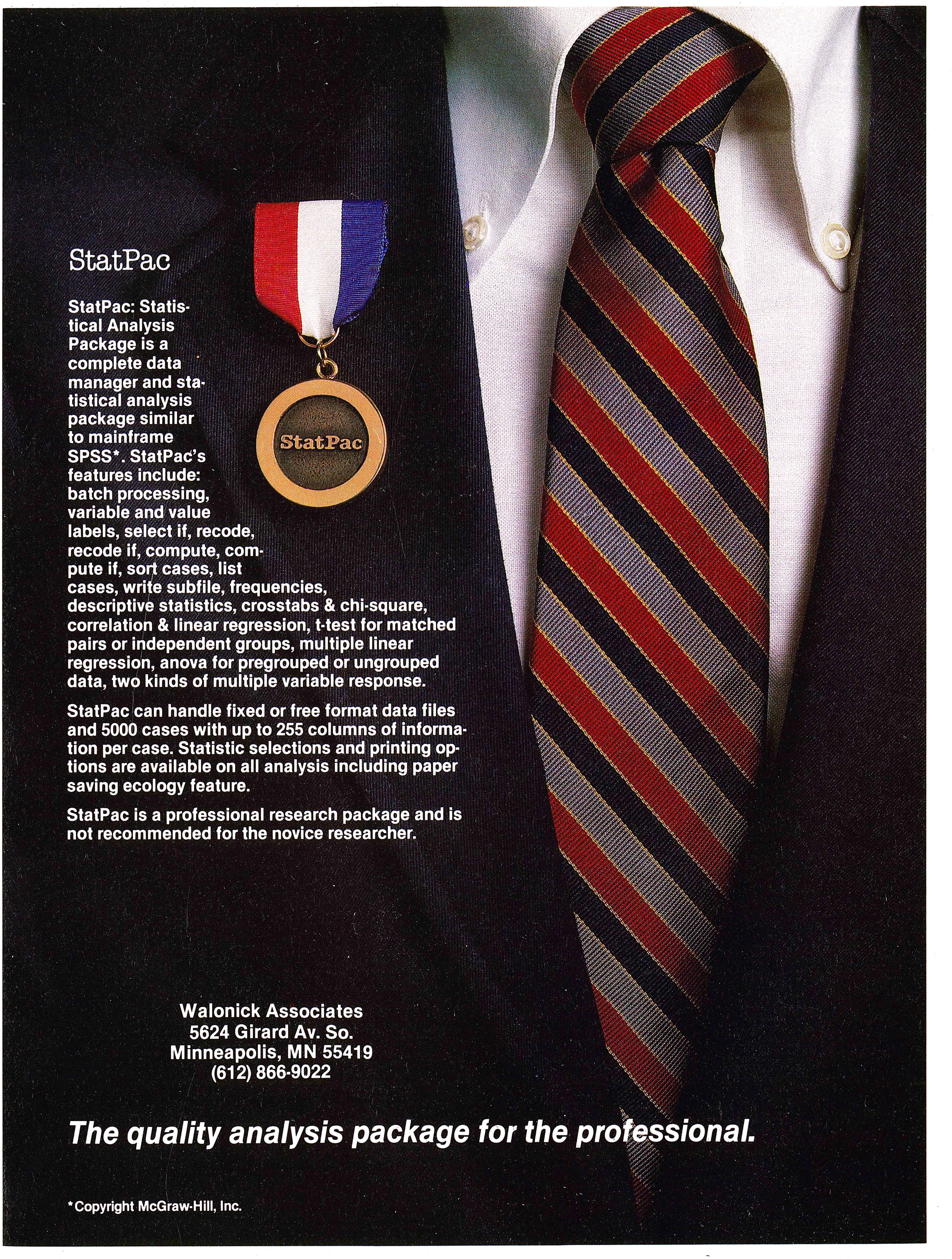

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THE PROFIT PLOT

by Jack Grushcow

Last month we took the first step in forecasting the income statement. We constructed a spreadsheet that allowed us to examine historic trends in the sales and expenses of Drug World, our sample retail store. Now, let's complete that spreadsheet.

So far, our spreadsheet holds Drug World's two previous annual income statements. Using these figures from 1981 and 1982, we'll attempt to project sales into 1983. The idea is to use past trends to project future cash and sales targets.

Adding the Forecast Portion. If you followed last month's article, you should have the first seven columns (A through F) of figure 1 already in place. If not, follow the keystrokes and build the model now.

To enter columns G, H, and I into your forecasting spreadsheet, just add the formulas and formats as indicated. When you have done so, your screen should look like figure 2.

Examine the forecast section—the last three columns—of the model. As in the model's historic section, we have a column for the year's financial figures, the percent of sales that these figures represent, and the percent change from the previous to the current year. Let's look more closely at each of these columns.

The Year's Financial Figures. Unlike the financial data from the previous years, the numbers in columns G and H are calculated for you. These columns contain estimates generated from the estimates you enter in the percentage forecast column; in other words, the *% Forecast* (column I) controls the numbers displayed in columns G and H.

It is much more common to hear a manager say, "We expect sales to increase twelve percent over last year," than "We expect sales to be $10 million, an increase of $1,070,000 over last year." The model is designed to work the way this manager thinks.

The % Sales Column. The calculations in this column are the same as those used in the other *% Sales* columns. We divide the amount shown in each cell on the immediate left by the total sales shown at G13, then we multiply by 100 to create a percentage. This lets us see at a glance exactly how important a specific expense or income factor is to the overall health of our business. The larger the percentage of sales, the greater the impact this category has on total sales.

The % Forecast Column. This column, the driving force behind our forecasts, is where we take our best shot at peering into the future. The percentage estimates entered here are used to calculate the actual amounts displayed in the *1983* and *% Sales* forecast columns.

This column initially contains zeros because the model begins by assuming that sales categories will not change. For that reason, the amounts shown in the *% Sales* and the *1983* columns of figure 2 are identical to those in the *1982* and *% Sales* columns. To start creating our forecast, we will have to enter some numbers into the *% Forecast* column.

The formula we use to translate our previous year's results into our forecast estimates is:

Forecast = Previous Year * (1+(%Forecast/100))

Suppose we expect our sales of prescriptions to grow by 10 percent. Enter 10 at I6; the number 644,688 is displayed at location G6, replacing our 1982 prescription sales of 586,080. Plugging the numbers into the formula shows how this result was produced:

Forecast = 586,080 * (1+(10/100))
= 586,080 * 1.1
= 644,688

It's important to see how this process works if you want to get the most out of this forecast spreadsheet.

This model allows you to use both your analytical and intuitive skills to shape your forecast; looking into the future is both an art and a science. Let's see how this works by looking over the shoul-

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	A	B	C	D	E	F	G	H	I
1	/FR INCOME	STATEMENTS						/FR FORECAST	
2									
3		/FR YEAR	/FR % SALES	/FR YEAR	/FR % SALES	/FR % CHANGE	/FR YEAR	/FR % SALES	/FR % FORECAST
4	SALES								
5	/--	/--	/--	/--	/--	/--	/--	/--	/--
6	A	0	(B6/B13)*100	0	(D6/D13)*100	((D6−B6)/B6)*100	+D6*(1+(I6/100))	(G6/G13)*100	0
7	B	0	(B7/B13)*100	0	(D7/D13)*100	((D7−B7)/B7)*100	+D7*(1+(I7/100))	(G7/G13)*100	0
8	C	0	(B8/B13)*100	0	(D8/D13)*100	((D8−B8)/B8)*100	+D8*(1+(I8/100))	(G8/G13)*100	0
9	D	0	(B9/B13)*100	0	(D9/D13)*100	((D9−B9)/B9)*100	+D9*(1+(I9/100))	(G9/G13)*100	0
10	E	0	(B10/B13)*100	0	(D10/D13)*100	((D10−B10)/B10)*100	+D10*(1+(I10/100))	(G10/G13)*100	0
11	F	0	(B11/B13)*100	0	(D11/D13)*100	((D11−B11)/B11)*100	+D11*(1+(I11/100))	(G11/G13)*100	0
12	/--	/--	/--	/--	/--	/--	/--	/--	/--
13	TOTAL SALES	@SUM(B5..B12)	(B13/B13)*100	@SUM(D5...D12)	(D13/D13)*100	((D13−B13)/B13)*100	@SUM(G5...G12)	(G13/G13)*100	((G13−D13)/D13)*100
14	/--	/--	/--	/--	/--	/--	/--	/--	/--
15	COST OF GOODS SOLD	0	(B15/B13)*100	0	(D15/D13)*100	((D15−B15)/B15)*100	+D15*(1+(I15/100))	(G15/G13)*100	0
16									
17	GROSS PROFIT	+B13−B15	(B17/B13)*100	+D13−D15	(D17/D13)*100	((D17−B17)/B17)*100	(G13−G15)	(G17/G13)*100	((G17−D17)/D17)*100
18									
19	EXPENS	ES							
20	/--	/--	/--	/--	/--	/--	/--	/--	/--
21	WAGES	0	(B21/B13)*100	0	(D21/D13)*100	((D21−B21)/B21)*100	+D21*(1+(I21/100))	(G21/G13)*100	0
22	RENT	0	(B22/B13)*100	0	(D22/D13)*100	((D22−B22)/B22)*100	+D22*(1+(I22/100))	(G22/G13)*100	0
23	UTILITIES	0	(B23/B13)*100	0	(D23/D13)*100	((D23−B23)/B23)*100	+D23*(1+(I23/100))	(G23/G13)*100	0
24	PROFESSIONAL SERVICES	0	(B24/B13)*100	0	(D24/D13)*100	((D24−B24)/B24)*100	+D24*(1+(I24/100))	(G24/G13)*100	0
25	TAXES	0	(B25/B13)*100	0	(D25/D13)*100	((D25−B25)/B25)*100	+D25*(1+(I25/100))	(G25/G13)*100	0
26	DEPRECIATION	0	(B26/B13)*100	0	(D26/D13)*100	((D26−B26)/B26)*100	+D26*(1+(I26/100))	(G26/G13)*100	0
27	INTEREST	0	(B27/B13)*100	0	(D27/D13)*100	((D27−B27)/B27)*100	+D27*(1+(I27/100))	(G27/G13)*100	0
28	BAD DEBTS	0	(B28/B13)*100	0	(D28/D13)*100	((D28−B28)/B28)*100	+D28*(1+(I28/100))	(G28/G13)*100	0
29	TELEPHONE	0	(B29/B13)*100	0	(D29/D13)*100	((D29−B29)/B29)*100	+D29*(1+(I29/100))	(G29/G13)*100	0
30	THEFT	0	(B30/B13)*100	0	(D30/D13)*100	((D30−B30)/B30)*100	+D30*(1+(I30/100))	(G30/G13)*100	0
31	MISC	0	(B31/B13)*100	0	(D31/D13)*100	((D31−B31)/B31)*100	+D31*(1+(I31/100))	(G31/G13)*100	0
32	/--	/--	/--	/--	/--	/--	/--	/--	/--
33	TOTAL EXPENSES	@SUM(B20...B32)	(B33/B13)*100	@SUM(D20...D32)	(D33/D13)*100	((D33−B33)/B33)*100	@SUM(G20...G32)	(G33/G13)*100	((G33−D33)/D33)*100
34	/--	/--	/--	/--	/--	/--	/--	/--	/--
35									
36	NET PROFIT	+B17−B33	(B36/B13)*100	+D17−D33	/F$(D36/D13)*100	((D36−B36)/B36)*100	+G17−G33	(G36/G13)*100	((G36−D36)/D36)*100
37	/GF$								

Figure 1.

der of Drug World's manager as she generates her first forecast. She begins with her sales categories.

Generating the Forecast. Suppose the projected sales increase for prescriptions and over-the-counter remedies will be 13 and 19 percent, respectively. Let's enter these numbers in column I, rows 6 and 7, now.

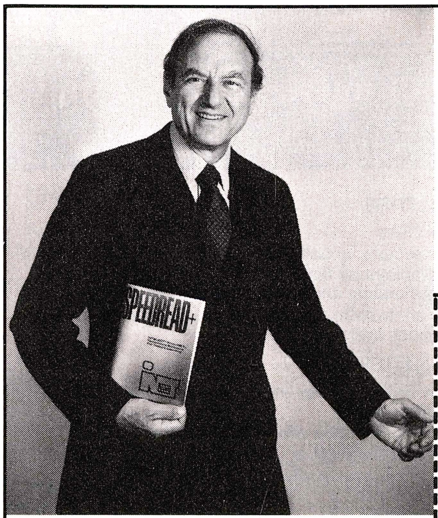
As soon as you type in these numbers, your 1983 estimates and the accompanying *% Sales* columns reflect these new percentage forecasts.

The model lets you easily change your estimated percent forecast, and the change is instantly reflected in your forecast amounts.

For example, a forecast change of 13 percent for prescriptions results in net sales of prescriptions of $662,270. Your intuition estimates a growth rate of 13 percent, but when you see this actual dollar amount, sales seem too high. It's one thing to throw out an estimate of 13 percent growth; it's quite another to see that you must sell $662,270 worth of prescriptions.

INCOME STATEMENTS						FORECAST		
	1981	% SALES	1982	% SALES	% CHANGE	1983	% SALES	% FORECAST
SALES								
PRESCRIPTIONS	528000.00	44.00	586080.00	44.64	11.00	586080	44.64	0.00
OTC REMEDIES	228000.00	19.00	264480.00	20.15	16.00	264480	20.15	0.00
COSMETICS	204000.00	17.00	222360.00	16.94	9.00	222360	16.94	0.00
SPIRITS	108000.00	9.00	105840.00	8.06	−2.00	105840	8.06	0.00
TOBACCO	96000.00	8.00	96960.00	7.39	1.00	96960	7.39	0.00
BOOKS/MAGS	36000.00	3.00	37080.00	2.82	3.00	37080	2.82	0.00
TOTAL SALES	1200000.00	100.00	1312800.00	100.00	9.40	1312800	100.00	0.00
COST OF GOODS SOLD	726000.00	60.50	781116.00	59.50	7.59	781116	59.50	0.00
GROSS PROFIT	474000.00	39.50	531684.00	40.50	12.17	531684	40.50	0.00
EXPENSES								
WAGES	252000.00	21.00	288816.00	22.00	14.61	288816	22.00	0.00
RENT	37200.00	3.10	37200.00	2.83	0.00	37200	2.83	0.00
UTILITIES	6550.00	0.55	7200.00	0.55	9.92	7200	0.55	0.00
PROFESSIONAL SERVICES	3600.00	0.30	3485.00	0.27	−3.19	3485	0.27	0.00
TAXES	24000.00	2.00	26200.00	2.00	9.17	26200	2.00	0.00
DEPRECIATION	12000.00	1.00	13080.00	1.00	9.00	13080	1.00	0.00
INTEREST	48000.00	4.00	54080.00	4.12	12.67	54080	4.12	0.00
BAD DEBTS	7200.00	0.60	6455.00	0.49	−10.35	6455	0.49	0.00
TELEPHONE	6000.00	0.50	6225.00	0.47	3.75	6225	0.47	0.00
THEFT	3600.00	0.30	2625.60	0.20	−27.07	2626	0.20	0.00
TOTAL EXPENSES	400150.00	33.35	445366.60	33.92	11.30	445367	33.92	0.00
NET PROFIT	73850.00	6.15	86317.40	6.58	16.88	86317	6.58	0.00

Figure 2.



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So, our forecaster decides to limit expected growth to 9 percent. Move your cursor back to I6 and enter 9. Notice the results: prescription sales have been reduced to $638,827.

This ability to see the actual "hard" number representing our percentage estimate makes this model a powerful forecasting tool. This tug-of-war between your rough percentage estimate and the actual forecast amount—the intuitive and the analytical—can forge a well-tempered estimate of what the future holds.

Using this model, we can change our projected growth rates and recalculate the formulas to see what the total dollar value of sales-by-department would be in 1983. The percentage sales composition is also recalculated.

For example, when we assumed prescriptions would grow at 13 percent, that figure represented 46.0 percent of total sales. After reducing our estimate to 9 percent, prescription sales comprise 45.1 percent of total sales.

You can think of this model as a window on as many different futures as you care to postulate. Since each estimate creates a different profit picture, you can bracket possible futures with best and worst scenarios.

Let's continue with forecasting our other sales categories.

The cosmetic department, while showing modest growth from 1981-1982, has been a disappointment. After examining various trade journals, our manager deduces that Drug World's increase in cosmetics sales is below national averages. Consequently, she decides to set up a special consultation counter staffed by a cosmetician, hoping thereby to increase sales by 11 percent.

The next sales area to consider is the liquor department. Given the high cost of inventory, numerous regulation problems, and low profit margins, the discouraging downturn in sales may be a signal to discontinue selling spirits in favor of a more profitable product line. However, this decision will be postponed until a more comprehensive sales history is available. For the time being, Drug World's management will be satisfied simply to reverse the negative trend. Our forecaster will, with in-store specials and increased advertising, anticipate a modest growth rate of 1 percent for 1983.

No major changes are planned to the tobacco or the books and magazine departments; growth rates of 2 and 4 percent, respectively, are forecast.

Take a few moments now to substitute different percentage changes and see how they alter the overall sales mix.

Before we leave the forecast income section, we need to forecast an estimate of our cost of goods for the coming year. We can get a clue of what this cost might be by looking at how we expect total sales to change in the coming year.

Row 13 contains total sales, and I13 informs us that, according to our estimates, total sales are expected to grow by 10.05 percent. This figure was calculated for us from our sales estimates.

It's usually safe to assume that if sales go up and inventory is ordered in larger quantities, the cost per unit will decrease as a result of quantity discounts. Let's suppose that an increase in sales of 10.05 percent will cause our cost of goods to increase by only 8 percent. By entering this number at I15, we complete our forecast of 1983 income.

Notice that we do not enter any information into line 17, *Gross Profit*. This line depends on the income information. Once we know what the expected sales and cost of goods are, we know the gross profit.

Most of us take a lot of pleasure in forecasting future revenues, but we have to spend money to make money. Let's look into forecasting Drug World's expenses. We use the same procedure to project expenses as we did to project sales.

Wages appear to be a big problem with Drug World and, although steps are being taken to reduce overtime, wages are still expected to increase by 17 percent. Enter 17 at I21 to calculate the forecast amount for 1983 wages.

The signing of a long-term lease has prevented a 1983 rent increase. To reflect this in our forecast, we leave the zero in the *% Forecast* column; the amount of $37,200 is shown for rent in 1983.

We could continue forecasting expenses but you should now know how to handle this model on your own. Figure 3 shows what your Drug World forecast should look like if you've been building the model along with this article.

Modifying the Forecast Spreadsheet. Although this specific drugstore example won't apply to many of the types of forecasting you'd like to do, this versatile model can be quickly changed to accommodate the forecasting needs of an entirely differerent business.

Let's say that you are a distributor for three different types of products; for simplicity, we'll label them products A, B, and C. Since we only require three sales categories, not the six that Drug World used, we first adjust the income section of the spreadsheet by deleting three rows.

We must be careful in doing that, however; deleting either the beginning or the ending point of a sum function—row 5 or row 12 in our model—would cause errors throughout the screen. The dashed border rows surrounding the income section mark the beginning

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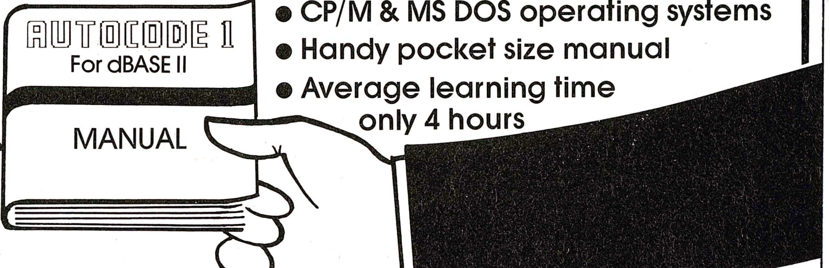

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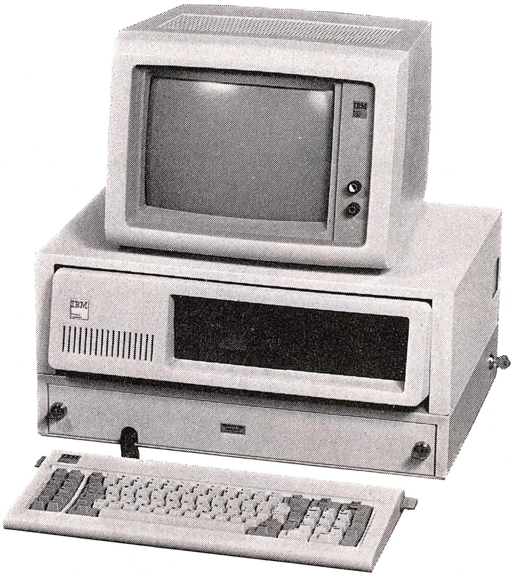

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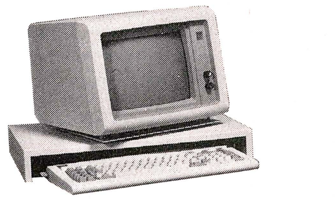

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                                1981   % SALES       1982   % SALES  % CHANGE      1983    % SALES  % FORECAST
SALES
---------------------------------------------------------------------------------------------------------------
PRESCRIPTIONS              528000.00     44.00  586080.00     44.64     11.00    638827      44.22        9.00
OTC REMEDIES               228000.00     19.00  264480.00     20.15     16.00    314731      21.78       19.00
COSMETICS                  204000.00     17.00  222360.00     16.94      9.00    246820      17.08       11.00
SPIRITS                    108000.00      9.00  105840.00      8.06     -2.00    106898       7.40        1.00
TOBACCO                     96000.00      8.00   96960.00      7.39      1.00     98899       6.85        2.00
BOOKS/MAGS                  36000.00      3.00   37080.00      2.82      3.00     38563       2.67        4.00
---------------------------------------------------------------------------------------------------------------
TOTAL SALES               1200000.00    100.00 1312800.00    100.00      9.40   1444739     100.00       10.05
---------------------------------------------------------------------------------------------------------------
COST OF GOODS SOLD         726000.00     60.50  781116.00     59.50      7.59    843605      58.39        8.00

GROSS PROFIT               474000.00     39.50  531684.00     40.50     12.17    601134      41.61       13.06

EXPENSES
---------------------------------------------------------------------------------------------------------------
WAGES                      252000.00     21.00  288816.00     22.00     14.61    337915      23.39       17.00
RENT                        37200.00      3.10   37200.00      2.83      0.00     37200       2.57        0.00
UTILITIES                    6550.00      0.55    7200.00      0.55      9.92      7200       0.50        0.00
PROFESSIONAL SERVICES        3600.00      0.30    3485.00      0.27     -3.19      3485       0.24        0.00
TAXES                       24000.00      2.00   26200.00      2.00      9.17     26200       1.81        0.00
DEPRECIATION                12000.00      1.00   13080.00      1.00      9.00     13080       0.91        0.00
INTEREST                    48000.00      4.00   54080.00      4.12     12.67     54080       3.74        0.00
BAD DEBTS                    7200.00      0.60    6455.00      0.49    -10.35      6455       0.45        0.00
TELEPHONE                    6000.00      0.50    6225.00      0.47      3.75      6225       0.43        0.00
THEFT                        3600.00      0.30    2625.60      0.20    -27.07      2626       0.18        0.00
---------------------------------------------------------------------------------------------------------------
TOTAL EXPENSES             400150.00     33.35  445366.60     33.92     11.30    494465      34.23       11.02
---------------------------------------------------------------------------------------------------------------

NET PROFIT                  73850.00      6.15   86317.40      6.58     16.88    106668       7.38       23.58
```

Figure 3.

and ending points of the *@sum* function and should be thought of as flashing the warning: Do not delete.

To delete three rows, place your cursor in row 6 and enter the /DR command three times.

To alter the labels, move your cursor to A6 and enter Product A; at B6, Product B; and at C6, Product C.

So far, so good. We've gone from a drugstore with six sales departments to a distributor with three product lines.

Following are the actual 1981 and 1982 sales figures for each of the three products:

	1981	1982
Product A	185,000	196,500
Product B	76,500	89,300
Product C	39,000	43,900

Type this data into the historic section of the spreadsheet in the same way you transferred the information from the Drug World income statements.

Figure 4 shows the income section of this spreadsheet after deleting the extra rows and entering the new data. Your screen, of course, still contains the forecasts and expenses from the Drug World example.

The expense section can be modified by a similar procedure to suit any requirements. First, move your cursor down the rows in the expense section and delete the rows holding expenses that don't apply to your business.

For example, if you own your premises, delete the rent row and replace it with one for your mortgage. Whatever your particular requirements, this model can contract or expand to fit your forecasting needs.

Summing Up. We began by building a model of a retail drugstore and used the 1981 and 1982 income statements as historic data for our model. We then projected sales and expenses into 1983.

Next, we quickly transformed our model from the retail drug application to fit a distributor's business, illustrating that this model can be applied to many types of forecasting of sales and expenses in various kinds of companies. ▲

```
     INCOME STATEMENTS

                          1981   % SALES        1982   % SALES  % CHANGE
SALES
--------------------------------------------------------------------------
PRODUCT A            185000.00     61.56   196500.00     59.60      6.22
PRODUCT B             76500.00     25.46    89300.00     27.09     16.73
PRODUCT C             39000.00     12.98    43900.00     13.32     12.56
--------------------------------------------------------------------------
TOTAL SALES          300500.00    100.00   329700.00    100.00      9.72
--------------------------------------------------------------------------
```

Figure 4.

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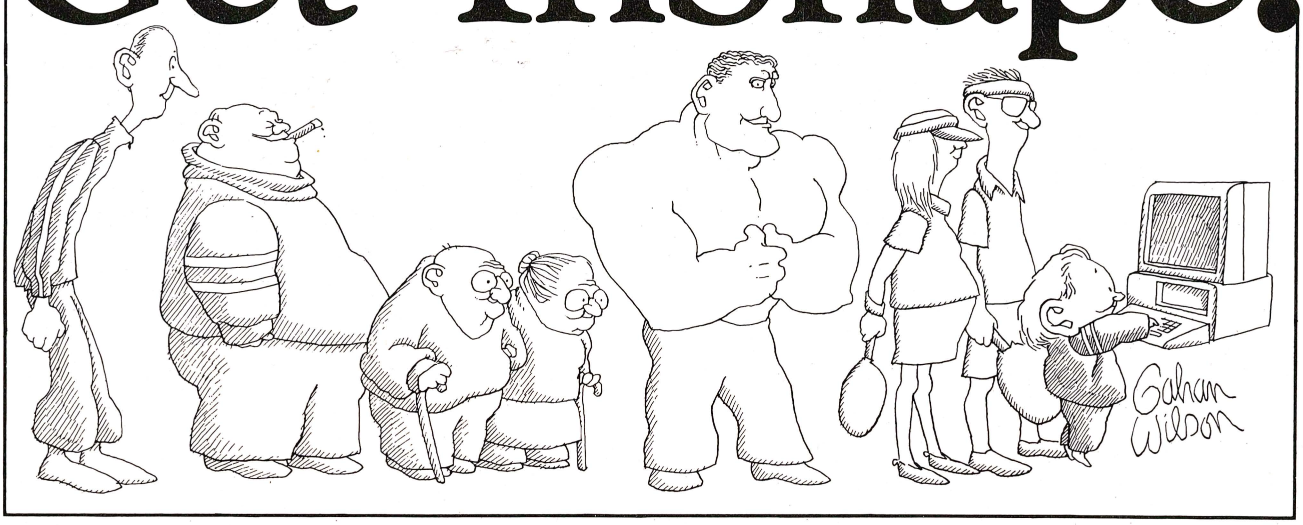

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"New technology requires a new order of tactics."
—Henry A. Kissinger, "The Purpose of War"

"You might say the Air Force was born because General Billy Mitchell respected authority somewhat less than he respected the truth. . . . Once, when a more sober follower attempted to get Billy Mitchell to calm down and quit antagonizing Army and Navy chiefs, Mitchell replied, 'When senior officers won't see facts, something unorthodox, perhaps an explosion, is necessary.' The residue of this philosophy is still in the Air Force."

—Brigadier General Dale O. Smith,
"A New Kind of Discipline"

AUTOMATING AMERICA'S AIR DEFENSE

A Network of XTs Stands Ready

Opposite Page: The first pc on wheels rides in the mobile ALCOP (alternate command post) train. Below: The engine of the ALCOP train was donated to the Air Command by the Alaska railroad.

by Michael Ferris

What we know about conventional warfare fills books, makes heroic cinema, and headlines the seven o'clock news. What we know about electronic warfare is zilch. Although America leads the race to automate the battlefield, most of our high-tech artillery remains tested but untried in actual combat. Some of it still makes great science fiction.

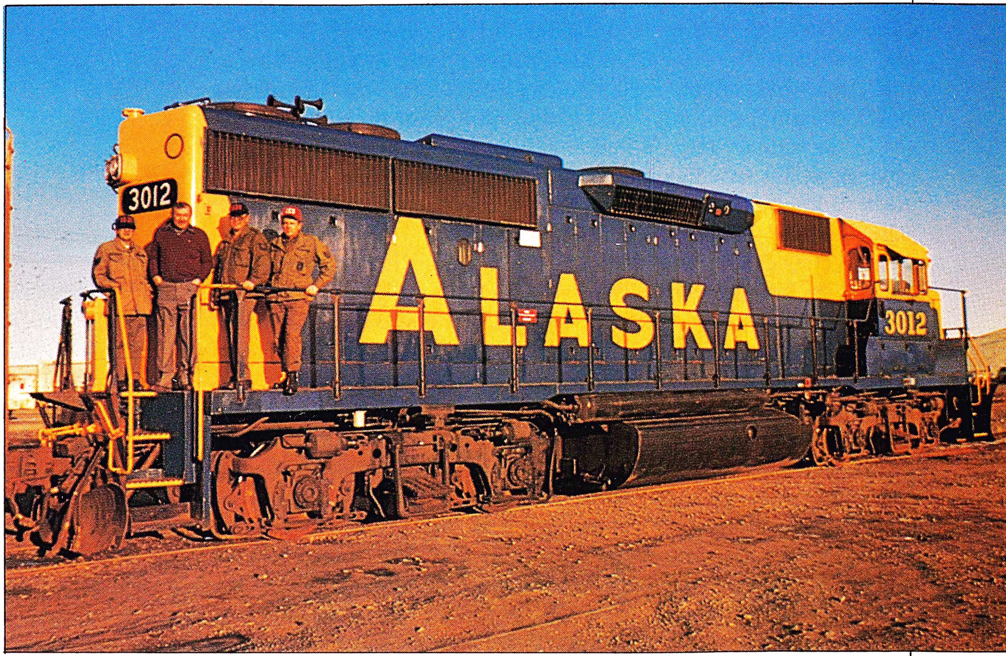
The problem with the boom in whistle-and-bell warfare is the need for specialized maintenance and operation—with fewer specialists available now than ever. A small and controversial solution—using micros and recruiting hobbyists—is working for the Alaskan Air Command. Until now, using part-time amateur programmers was considered dangerous, and micros were seen as a limited, inefficient resource.

Sure, the personal computer has splendid peacetime applications—like spreadsheets, word processing, and graphics—but there was serious doubt that any micro had the muscle to hold its own in the heat of battle. When the order to automate the battle staff of the Alaskan Air Command was filled, a network of IBM Personal Computers flexed itself nicely, thank you, and took some new ground.

Two things the Alaskan Air Command wants the public to know:

First, the Alaskan Air Command is our country's first line of defense. Alaska is so close to the Soviet Union that in wintertime it is possible to walk across the forty-four-mile frozen Bering Strait from their Siberia to our Seward Peninsula. From there, it's straight to the industrial heartland of America.

Second, they do know how to save a buck. All military spending isn't in the red, and every item on their budget doesn't run over cost. For a computer automation job that could have been done on mini or mainframe, the fact that they chose micros says plenty.



The order came down from the commander, General Lynwood E. Clark: a state-of-the-art computer support system for ALCOP, the mobile command post, a converted railroad car that serves as backup command center for the Alaskan Air Command. Menu-driven and friendly, no experience needed. No operator required. No hassle. It must have, in military-speak, portability, survivability, redundancy, and sustainability.

A whopping order.

What General Clark wanted was a computerized database that would travel. One that would still network even if the main terminal was knocked out or several supporting ones went under. One that anyone commandeered in an emergency could boot and run in thirty minutes. And one that could be updated as disaster progressed, whether it be trembling earth or falling bombs.

A whopping order, but it was filled.

Top row (left to right): Captain Pete Rensema, The Mover. Captain Dan Rambow, Blue Sky Leader. Captain Skip Gaudreau, Nuts and Bolts. Right: A student of Basic debugs the database.

General Clark's orders for a battle staff database landed on the desk of Captain Peter Rensema, Chief of Protocol. Rensema's job, as head of steering, was to keep the dust off the concept "state of the art" and keep the project flying. He became its driving force—keeping paperwork afloat, requisitioning funds, drawing up the reports. Sending, bending, and hustling things up the chain.

In the military (big on middle management), things are done in chains: chains of command, chains of protocol, chains of paperwork, and chains of approval. It's a time-honored system, and it works as well as can be expected: slowly.

Which is exactly how the Battle Staff Automation project would have come into being had it not been for the enthusiasm of the big boss. "General Clark was very helpful on this project," says Rensema. "It's not unusual to order up something like a microcomputer and get reassigned. Eight months later, a microcomputer shows up and nobody knows where it came from."

Or, as a poster in the base library puts it: Getting things done is like mating elephants. It's done at a high level, there's a lot of roaring and screaming, and it takes two years to produce results.

"On this project, the general saw to it that we only went one week between the paperwork and the first pc," he says. Assigned the project in March 1982, Rensema had acquired two pcs by the first of May. The chains kept rattling, louder each time.

The five-pc prototype of the database network got a field workout last January and February during a large joint-service exercise called Brim Frost '83. The prototype's performance exceeded all expectations. The final version of the micro system has snowballed into a statewide network of thirty-six XTs that will run a beautifully compiled 900K, with two megabytes of interactive capabilities and one and a half megabytes of four-color maps.

When the button is pushed, fifteen of the XTs are earmarked for the battle cage of the ROCC (Regional Operations Control Center), the heart of surveillance operations at Elmendorf Air Force Base in Anchorage. On command, they will be pulled from their peacetime positions and go to the bridge, overlooking radar operations on the main floor of the computerized war room.

From the battle cage, Air Force brass and area managers in logistics, rescue, security, police, and engineering will watch disaster or battle being played out on the screens of dozens of radar-monitoring CRTs. This battle staff is able to manage its resources under any combat condition—from a limited tactical scenario to reconstitution of forces following a nuclear attack.

The XT network will keep decisions flowing—giving crucial logistical information on demand and calculating status and options—a job formerly handled by grease pencils on plastic.

Information in the database includes sections on aircraft characteristics (theirs and ours), radar status, Army planning data, a duty post synopsis, medical facility status, rescue coordination, succession to command, weapon statistics, civilian resources, emergency action checklists, transportation resources, and nuclear, biological, and chemical data.

Altogether, a thirty-six-item menu. Some items are static—like the medical, duty post, and checklist data—standing by with facts at hand. Each area manager is responsible for maintaining current information in his area file.

Some item's files are real-time, so they can be updated periodically. Fuel status, for example, maintains a running log of fuel resources, fueling equipment, airfields, billeting, munitions, and aircraft. The knocking out of a landing field brings the next best location up for consideration. Codes are required for access to all interactive files.

Some files are for calculation only. By means of an 8087 math chip, weather forecasts and conditions can be figured with built-in daylight/twilight, sunrise/sunset, and moonrise/moonset tables. Winds aloft and tides can also be determined.

Reports and messages can be generated with a word processing file; some stations will have printers. In phase two of the automation, electronic mail capabilities will by-pass printing; reports will be sent direct and downloaded. Special cryptological gear is used for sending encrypted data files across regular phone lines.

Full-color charts, maps, and viewgraphs can be displayed and printed. If a radar station is hit, for example, its location is entered and a fresh map is drawn, minus the downed site.

Most of the huge volume of data falls into discreet status categories—from critical to highly sensitive. These files require an additional password for access and are displayed with the classification in flashing red characters.

The automated battle staff database is a complex and responsive piece of specialized programming, involving several thousand man-hours of careful planning. It's unlike any commercial database on the market; it has the feel of being its own multiuser programming environment. Containing as much coding as the most advanced micro flight simulator, it plays like the granddaddy of all war strategy games. Except it's the real thing.

Disruption of an enemy's C3 (communications, command, and control) center is a primary function of electronic warfare. Electronically, the ROCC is a very noisy target, situated center stage in the Alaska theater. If the ROCC goes dark, an organized assault turns into a dirty picnic for the opposition.

This is why the remainder of the thirty-six XTs will see action in other strategic spots—networked to each other and the ROCC—storing, updating, retrieving, and transmitting data at a responsive wartime speed via an Orchid Technology PCnet local area networking system.

In the event of natural or wartime contingency, the Alaskan Air Command and related organizations become Joint Task Force Alaska, maintaining air superiority and supporting Alaska-based ground forces.

During peacetime, their job is training and deploying combat-ready, tactical air forces to defend our country's land, water, and air space. Stationed up there, backstage U.S.A., they're rehearsing a show no one hopes they'll have to perform—World War III and selected short skirmishes.

When you put all the $12 million fighting jets, warrior spirit, and wild blue yonder aside, the Air Force is primarily an intelligence-gathering system. Most air resources are devoted to it. The rest are defense perks like bombing runs, air transport, and—the ultimate—air superiority, or, having more planes in the sky than the other guy.

A few years stationed at Elmendorf Air Force Base, just outside Anchorage, is a great way to cement a military family—it's a choice assignment. Especially living off the base. It's pure adventure living in a city where a ninety-minute drive home, up into a homestead cabin in the hills, can be a life-threatening situation. If your car breaks down, be prepared to sleep in it until Triple-A arrives.

Living on the base puts a bustling seaport in your front yard. The front door of Elmendorf is the back door to the city. Before the Alaskan Air Force was created in 1942, Elmendorf was an airstrip adjacent to the Army's Fort Richardson. Before that, it was thirty-five homesteads and a fur farm. The first airmen assigned there lived in eight-man metal huts and worked in tarpaper shacks. They bathed in Ship Creek every day, until soapsuds appeared in city drinking water.

The Alaskan Command is one of the oldest in the Air Force, itself a young pup compared to its fighting Army and Navy brothers. In the forties, when the Command was known as the Eleventh Air Force, it helped drive the Japanese off the Aleutian Islands.

Personal computers—in war and peace—are definitely part of the new Air Force. Elmendorf is a haven for IBM's DisplayWriter, and micros of all stripes abound.

The legal department has Apples for management and trend analysis. Logistics has Osbornes for fuel applications. Flight Operations has a Cromemco for keeping current in flying proficiencies and aircraft data for sorties. Airlift Maintenance has a spare-parts database on a Zenith. Engineering has a maintenance and rebuilding projects database on a Radio Shack.

When Rensema approached them, the Air Force's Data Automation department refused to believe you could build an information management system from the bottom up, using personal computers. They suggested a Hewlett-Packard 3000 mini with six stations, or a mainframe multiuser system. The sixteen-bit pc with its lean price tag was starting to look good. Over thirty stations could be had for the price of the H-P's six.

But would you trust your country to one?

Air Force demographic studies say we'll have to. They're scrambling to automate every function they can, because of a dropoff in enlistment expected in the 1990s. The attempt to alleviate a manpower shortage with temporary programmers piloting tiny micros instead of operational system engineers flying mainframes is shaking up the computer camp.

Old-line Data Automation procedures, it's turned out, won't work with micros. "The old way of thinking is to have an operator at a machine with somebody over his shoulder telling him what to

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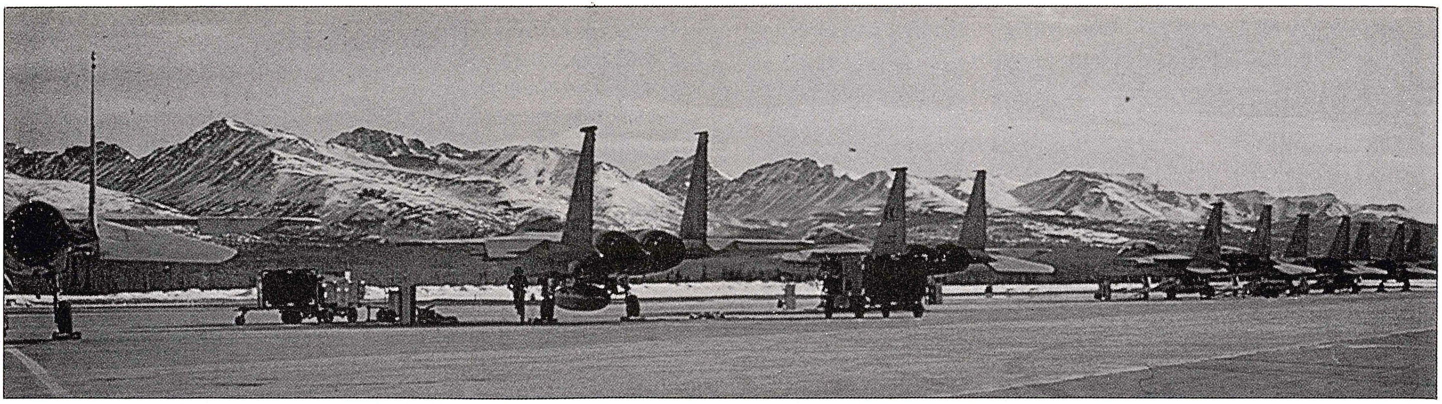

Painted a flat camouflage gray, a row of $120-million F-15 jet fighters stands ready on the flightline at Elmendorf Air Force Base.

do," says Rensema, "the operator being fully trained on that machine." With more computers than ever, and a lack of good software programmers hitching up, the military sees it's going to have to kiss the old way good-by.

The new way is drafting what the Air Force calls the amateur hobbyist: Joe Average with maybe a computer at home, or a language under his cap. He will be transformed into G.I. Joe Micro, trained to program part time as part of a project staff. Programming for machines that any officer can operate when duty calls. No shoulders to shout orders over. No special operator.

Just read this, Sir, roll up your sleeves, and compute. Sounds like it threatens the way men wage war—like a boss being told he's got to pull secretarial duty?

Exactly. It's even splitting the ranks. "The Air Force may be pushing too hard," says Rensema. "There's antagonism on both sides. One group wants it this way, and they're ready. Another wants no change in fighting at all. Another third doesn't care."

Black, white, and gray. It's the cleanest split any new technology ever gets. The only consolation: Micros can't do it all. What they can do is enough to harass a status quo.

A technical consultant was drafted into the automation project as soon as he was found. Dan Rambow was recalled out of a civil engineering position to become head hacker and idea man—wrestling hardware, setting direction, and training. He brought a sense of intuitive thinking to the project that mainframe people lack: Like, if a Percom hard disk won't boot sunny-side up, why not turn it on its side? Sounds crazy, but it worked.

In civvies, Rambow heads Rambow Enterprises, a construction software house. He's also the man who bought the first pc in the state of Alaska. His purchase receipt reads 0001.

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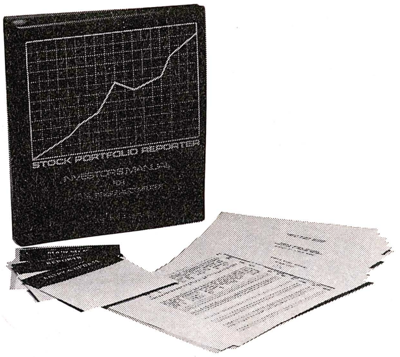

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Surviving Exercise Brim Frost was the real test for soldiers fighting a mock war in subzero weather.

His first duty was to set up training for sixty-eight fresh hobbyists to program the system prototype. One of the first men trained was a professional mainframer, Skip Gaudreau, who became Rambow's right-hand man, getting down with the nuts and bolts and debugging and documentation. Holding the project down while Rambow did the blue sky stuff.

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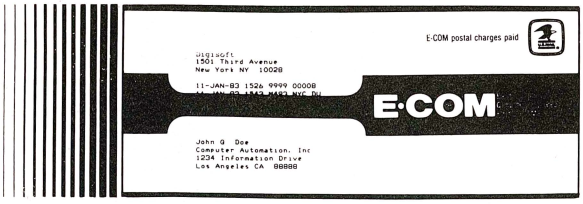

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Several languages were considered for the programming. Pascal was out; it had no graphic capabilities at the time. A delay in the arrival of a Cobol compiler scratched that language. "There's always a problem just getting supplies up here," says Gaudreau. "The government can't go mail order, so we had to go through ComputerLand as local support. To them the Air Force is just folks."

Basic was eventually chosen because it's easier to teach in a short time. Its simplicity converted doubters, including Gaudreau, who originally opted for Cobol. "Basic's as good as anything else when it's compiled. Using it was easier than writing in assember," says Rambow.

Some sections of the database and related networking are mostly the work of a handful of stalwart souls who had special area knowledge. With only four months from first class to first show-and-tell exercise, every bit of background counted.

Reservist Lieutenant Tim Powell is a qualified weather forecaster with mainframe experience. The calculation tables and forecasting routines of the interactive weather file are his handiwork.

Another mainframer, Technical Sergeant Hank Revis, was a three-day convert to Basic. He designed the munitions and transportation sections.

Senior Master Sergeant Ed Gay, of Atari 400 and 800 notoriety, worked on the graphic representations and did the coding for the briefing charts.

A Cobol expert with a Vic-20 at home, Captain Ron Moen, did the code for three of the interactive programs and nearly half the menus. The menus were first fleshed out as database files using *TIM III* software, then switched to true random files using Basic with a Rambow-designed conversion routine.

A crackerjack Apple programmer, Sergeant Chuck Kinney, worked out the communications interfacing. "We experimented a lot with hardware," says Rambow. "We were always on the phone getting feedback from vendors in the lower forty-eight." Several combinations of disks, boards, and patches were tried.

Added menu selections caused the team a lot of growing pains between Exercise Emerald Pingo in September and Exercise Brim Frost in late January. Emerald Pingo was the system's first show and tell. The pc was installed and the train was run up the track to a geographically isolated location.

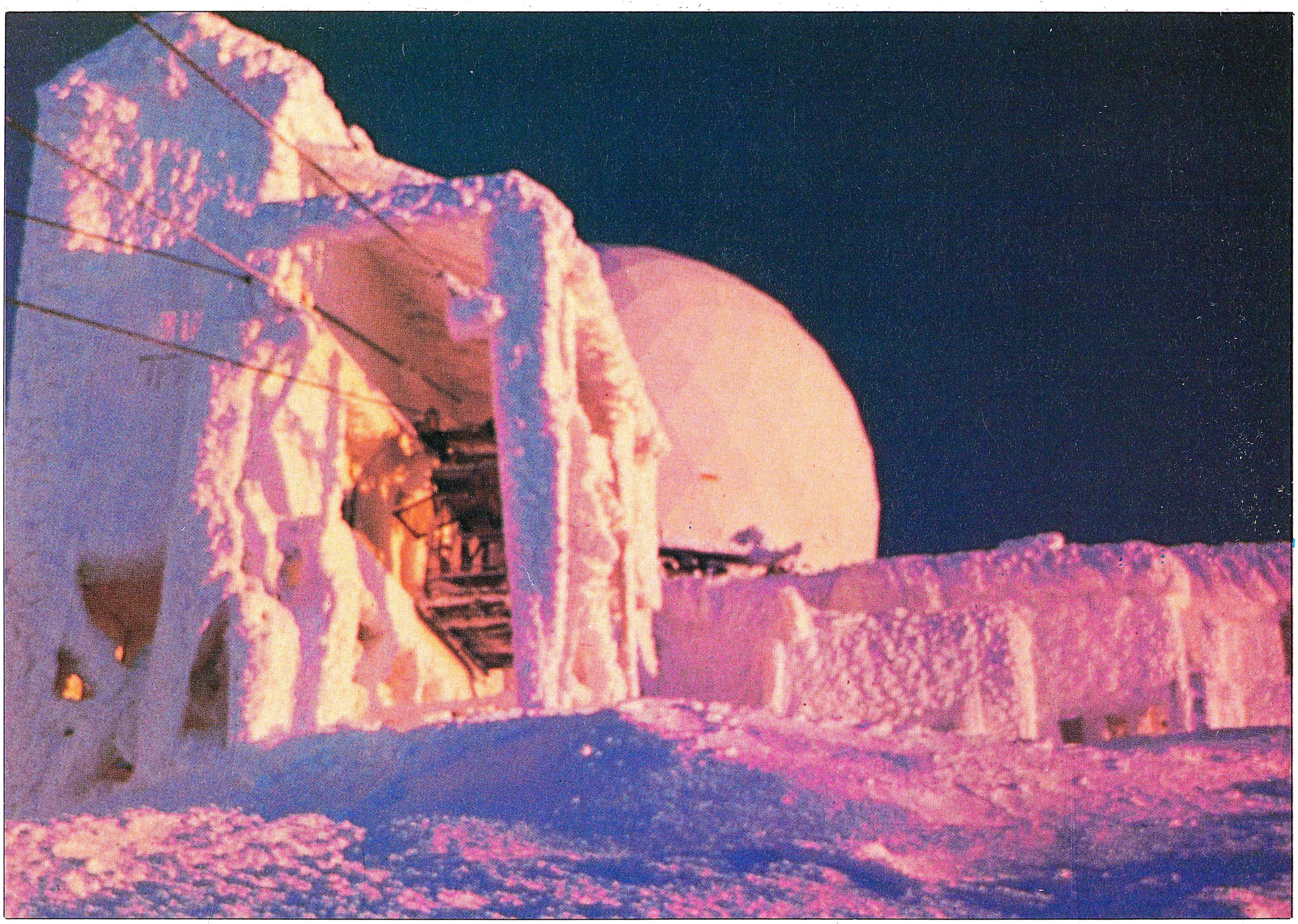
Also aboard the train was a conventional Teletype for relaying messages. The pc crew was fighting communications people tooth and nail. "They were reluctant to trust the computers. They said we were wasting our time, figuring we'd suffer from high-frequency radio interference. It was rough—we were trying to step out on our own," says Rensema.

Then the Teletype system failed. There was a short, quiet moment, but a great one. "The pc network kept the train talking to Elmendorf via modem," Rensema explains. The Teletype was out of commission for the entire three-day exercise.

Rensema, Rambow, and Gaudreau went home singing. Department heads turned, and everyone wanted in on the automation. Meeting training and equipment demands was the biggest problem. "We all burned a lot of midnight oil on this one," says Rambow.

Gaudreau found himself checking wires at 4:00 a.m. "We were moving files back and forth up to the last minute before Brim Frost," he says. "There was a lack of time to double-check things."

By the time the exercises got under way in January, seventeen



Seen as dots on the database maps, remote radar stations are eerie, other-worldly outposts in the far reaches of Alaska.

sections had been debugged and documented and twenty hadn't. The system was installed and put up for grabs; the bugs became part of the combat simulation.

Every two years the United States Readiness Command, out of McDill Air Force Base in Florida, puts on a "golly gee whiz" joint readiness exercise called Brim Frost. It's always an eye-opener, a survival more than an exercise.

This year, three hundred fifty miles north of Elmendorf, in minus-twenty-degree weather, twenty thousand troops from the lower forty-eight split into opposing Army brigades. As friendly and unfriendly forces, they captured and recaptured several objectives, with a lot of unconventional warfare situations thrown in for surprise.

One of those surprises was a nonmilitary unit of light planes, zigzagging like guerrillas in and out of the simulated battle, planting explosives and such. Like the network of pcs in their various battle staff positions, they also proved effective beyond expectations.

Some of the combat applications banged out on the database were updating items while on-line; transmitting messages, charts, and maps; computing aircraft fuel expenditures, given a mission profile; providing simple searches; and summing up fuel, munitions, personnel, and aircraft assets. Nothing glitched, nothing crashed. The flag was raised.

Programmers with Readiness Command itself buzzed around the smooth-functioning pcs, marveling at the database. A little pc fever went back to Florida with them. "They had been attempting a similar system using Apple graphics, 64K, and no compilers," says Rambow. "Ten months' worth of work and they weren't even close to what we had."

Turns out it's the same story on any air base. "Microcomputers are an unusual course of action, but you've got to start somewhere," he says. "The military likes to see you cut it out of your own hide, then they see it work and say, 'great.' "

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The battle staff automation was slotted in three phases. The first stage is complete. The XTs are being unpacked, the programming staff diligently debugs. Phase two, deadlined for the summer of 1984, involves hooking up peripherals and electronic mail. Phase three will include connecting to the central ROCC mainframe database, as well as Army, Coast Guard, and civilian computer systems. This is projected for the late 1980s.

Of the three men originally involved in the battle staff automation, only Rambow is going to stick around. Gaudreau is shipping off to Camp Smith in Oahu, Hawaii, to work on computers there. Rensema is transferring to Wright Patterson Air Force Base in Dayton, Ohio, to get a master's in space operations technology.

Rambow will head the peacetime applications programming effort, shuffling packages and programming to suit. He'll also see to any of the battle staff network's whistle-and-bell needs. With his combination of intuitive and technical strengths, he's suddenly a very hot property. ▲

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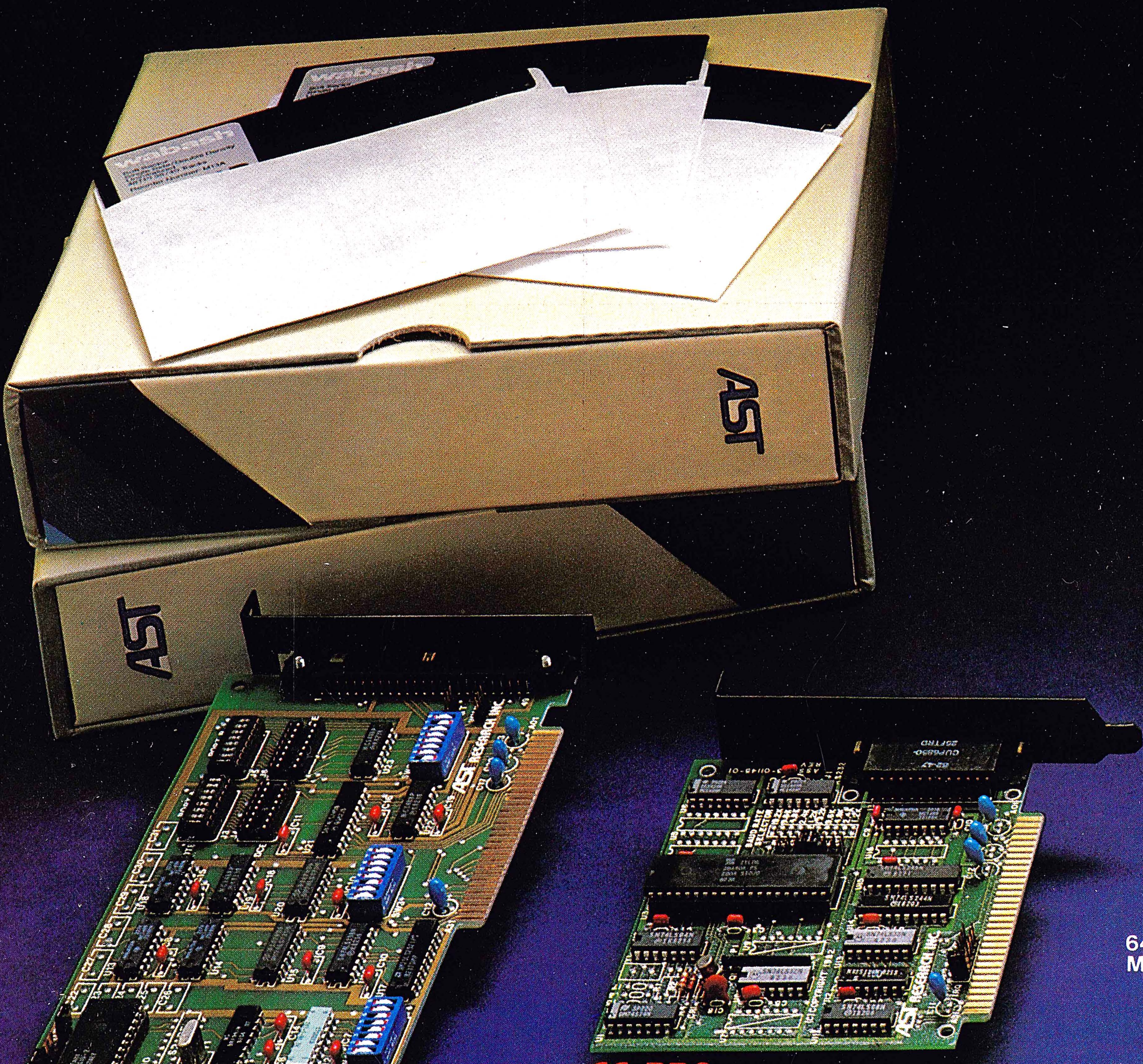

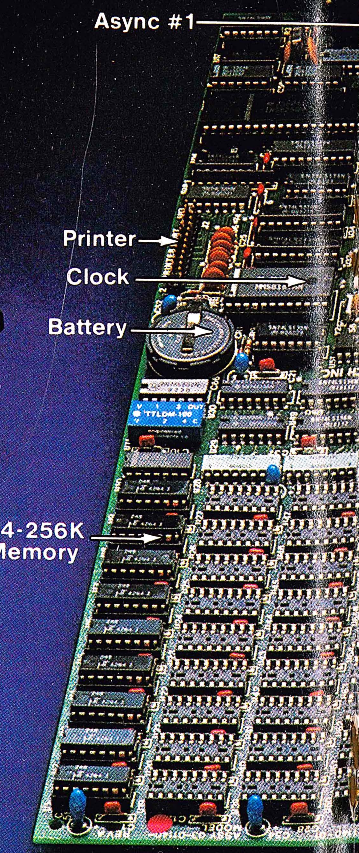

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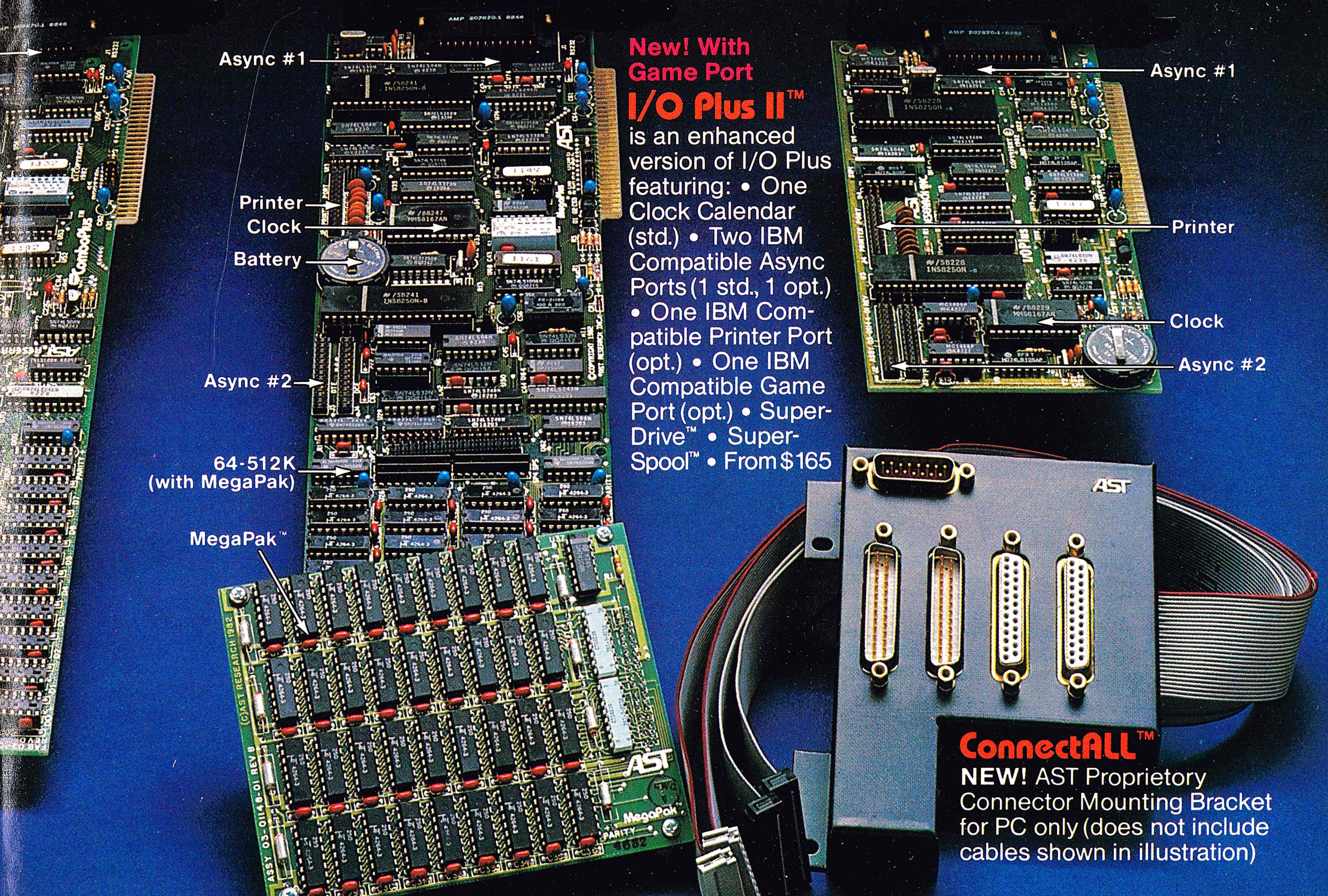

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BOARDS & BUSES

by Steve Schmitt

Departing from the hardware-review theme of the past few installments, this month's column deals with a potpourri of topics, ranging from microcomputer memory issues to speculation on future personal computers from IBM. Somewhere in between, we'll talk about the Intel 8086 family of microprocessors and how they may influence developments at IBM. Yes, spring turns one's thoughts toward new beginnings and a little cleaning of house.

Thanks for the Memory. The ability of sixteen-bit microprocessors to support memory sizes larger than 64K has been a real blessing. It's opened the door to many new sophisticated applications. Now, however, the industry needs to establish a de facto minimum memory size for sixteen-bit machines. Software developers need a bottom line for designing their programs.

Currently, this threshold seems to be 128K. Why? For one reason, IBM sells their new system (the XT) with a minimum of 128K. Machines in the same class, such as the Texas Instruments Professional Computer and the Victor 9000, offer at least 128K and usually 256K. Indeed, the XT supports 256K on its system board. With the trend toward integrated software systems, the de facto memory minimum may, in the near future, be pushed to 256K or more.

It would be good if some sort of standard were established soon. This would lead the way to better, more powerful software. More important, software development time would be reduced, because programmers wouldn't have to spend as much time bit cramming.

There are two more points to be made about memory as it relates to the pc. One has to do with the obscure problem affecting systems blessed with large memory; the other is a little surprise for individuals planning to expand an XT.

If you have an XT with 128K and want to use one of the many available combination boards with memory, clock and battery, serial port, and so on, note one thing: The pc must have all 256K bytes of system memory in place before a memory expansion board can be used. That's right. IBM wants more of the memory business.

What to do? Simple. Most expansion boards that are worth anything use sockets to hold their memory chips. Take the memory chips from the combination board and use them on the pc system board. If you have never done this before, carefully read your installation guide or have your local dealer install the memory. But be aware of several potential problems; this may void your IBM warranty; it may also void the combination board warranty; the combination board may not work without some memory on the board itself; and moving chips around increases the chance of hardware malfunction. Check with a reliable dealer before expanding your XT.

The IBM pc supports 544K of memory, and the XT handles up to 640K. What if you have more memory than this? Usually, everything works just fine. The 8088 processor addresses up to 1,024K, which leaves a significant portion of memory capacity unused. Some of the space is reserved for graphics memory and other functions. But, aside from one minor problem, there's no obstacle to your using memory in excess of IBM's stated limits.

The minor problem stems from the method by which the pc initializes the hardware and checks its memory. The pc uses parity checking to detect bad memory cells. When the machine is turned on, only the first 544K (640K on the XT) is initialized and checked for parity errors. Any memory over this amount is not initialized. If a memory access (read) over 544K is attempted, the pc

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halts with a parity-error condition.

Briefly, parity-checked memory works as follows: An extra bit, called a parity bit, is associated with each memory location. The bit indicates whether the number of 1s in its associated byte is odd or even. If one bit in the cell happens to malfunction and change its value, a parity check on that cell will disagree with the setting of the parity bit, and the problem will be detected. If more than one bit should change (odds are high that this will never happen), the error may or may not be detected.

Parity-checked memory is initialized by writing data to each memory location; reading a memory cell before it has been initialized may cause an error.

Since most programs write a location before ever reading it, this problem is seldom encountered. However, some programs scan memory for special strings; a hard-disk customization program, for example, may look for an identification message in the BIOS. Such programs could cause the pc to halt. Using the debugger to read uninitialized memory could do the same.

The problem can be fixed by running a little assembly routine in an Autoexec.bat file that simply writes to all memory locations above the program's end.

The Intel 8086 Family. The heart of the IBM is the Intel 8088. This chip is a member of a family of microprocessors that support a common instruction set. In terms of power, it is, in fact, the runt of the family; the 8088's siblings offer IBM significant potential for expanding its line of microcomputers while maintaining compatibility with existing software.

There are six microprocessors in the family (which is commonly described as the Intel 8086 family). They are the 8088, the 8086, the 80188, the 80186, the 80286, and the 80386 (see the table on the following page). The 80188, 80186, and 80286 are just starting to be produced in quantity. The 80386, on the other hand, exists only as a qualified rumor. It's supposed to be a full thirty-two-bit version of the 8086.

The 8088 and 8086 are basically the same, except that in a single memory cycle the 8088 can handle only eight-bit data items, while the 8086 can handle sixteen bits. The 8086 is also about 30 percent faster than the 8088. Because the 8088's data path is only eight bits wide, some contend it isn't a "true" sixteen-bit processor. Since, however, an 8088 can do everything an 8086 can (aside from fetching or writing sixteen bits at once), the contention is almost without merit.

The 80188 and the 80186 are analogous to their 8088 and 8086 counterparts in terms of data-path size. These two processors are twice as fast as their predecessors and pack on one chip just about everything needed for a complete computer system. One 80xxx replaces about thirty of the support chips used in most 8086 systems today. This makes for cost savings because it economizes on-board space and component count.

The additional speed of the 80188 and 80186 comes from a look-ahead technique used to process instructions. Termed "pipelining," the technique divides the processor's functions into multiple stages. By dividing labor and anticipating the instructions that will be fetched next at any given moment, these processors can be working on several operations at once; the parallel activity enhances the computer's overall execution rate.

The 80286 is a powerful microprocessor. Sporting an on-chip memory management unit, the 80286 can address 1G (a gigabyte—that's a thousand megabytes) of RAM. When you consider that the largest 5.25-inch hard disks offer around 100 megabytes of storage, this is quite an impressive number. In addition, the processor runs at a clock speed approximately eight times that of the 8086.

The on-chip memory management permits a very clean implementation of virtual memory. Virtual memory is a technique whereby a small amount of physical memory is made to appear to the program or to the user as a large amount. This is accom-

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8086	1.3	2.0	—
80188		2.0	2 DMA channels, clock generator, 3 16-bit timers, memory, select logic, bus controller, and interrupt controller
80186		2.6	
80286		8.0	memory management/protection unit, 16M physical, 1G virtual address space
80386		40.0	???

Comparative performance statistics for the Intel 8086 family. All speeds shown are relative to the 8088 running at 5 MHz. The performance spec shown for the 80386 is according to an Intel spokesperson.

plished by the transparent swapping of blocks of data (or program code) between RAM and disk.

Virtual memory can reduce the amount of RAM required to run a program without causing a significant reduction in performance. Large mainframes, such as IBM's 370, employ virtual memory.

What To Expect from IBM. Many sources have been speculating on future IBM microcomputer products. Rumors of forthcoming products named Peanut, Popcorn (would you believe, Crackerjack?), and PC II, among others, have been circulating for some time. Most of the predictions are guesses from reliable technical experts.

But the important thing to remember is that IBM is marketing-oriented. Nobody has ever accused Big Blue of having the most technically advanced computers and software (although many of their products are quite sophisticated). What IBM does so well, however, is to find out what customers want and provide it. What sounds the most technically appealing may not always turn out to be IBM's next product.

The XT is an instructive example of IBM's planning. Even though there is faster, more cost-effective hardware available, IBM did not change the basic pc. Why should they? If they came out right away with a technically superior microcomputer, they'd be cutting their own throats. The XT provides enough new features and cost reductions to stay close to the competition—without making the pc obsolete. Expect IBM to provide gradual improvements to the pc line.

Market gurus now distinguish three major microcomputer markets. On the low end, there are machines that sell for under $1,000; on the high end, there are machines going for $10,000 or more. Then there's the middle ground, the $2,000 to $8,000 territory, in which the pc has made its niche. Expect major new product announcements from IBM to come in the other two categories.

Here are some technical guesses about what IBM might do. First, they might produce a small, consumer-oriented system for about $800. This would be targeted for in-home and educational markets. The other approach they may take is to produce a high-end system supporting several users and integrated software systems. Cost of the high-end microcomputer could run upward of $10,000.

The small system (Peanut?) will probably use an 80188 and come in a fairly small package. Because the 80188 has so much hardware on-chip, memory and a few communications chips will be the only extras needed by this system. Other hardware will include IBM's four-inch floppy disk drive, color graphics support, and connections for keyboards, game input devices, video monitor or television, and printers. Software will be targeted at the home market and will include games, simple business packages, and educational software. The operating system will be "hidden" by an easy interface that doesn't require a college degree to use. A scaled-down MS-DOS will be an option. Don't be surprised if something like this is available by fall, just in time for the Christmas season.

The luxury pc is harder to predict. It will probably include an 80286, a hard disk, hi-res graphics, a mouse, 1M of RAM, and multiuser capability. A Xenix (Unix-like) operating system featuring virtual memory is likely. Software will probably incorporate the Lisa/Smalltalk philosophy but run faster than Lisa's.

Expect extensive support for data communications and networking. Expect, furthermore, a system that's highly modular, allowing easy expansion and redundant (fault-tolerant) configurations. Sophisticated software will be the key to success in this market.

These are, of course, highly speculative projections. IBM's 12 percent interest in Intel and upward-compatibility issues make another Intel 8086-based product fairly certain. Because of the low-cost angle, an 80188 or 80186 product within a year also appears a sure bet (one rumor going around claims that 30 percent of Intel's 80188 production will go to IBM). But who knows the whims of the marketplace? ▲

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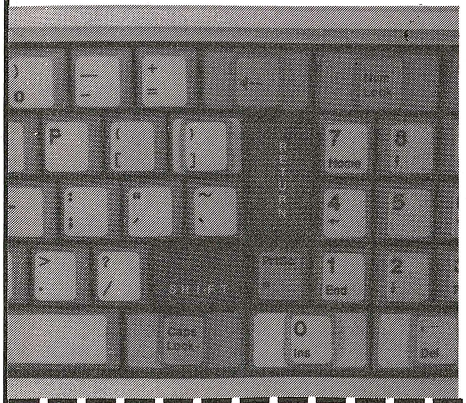

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PASCAL

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Part Three of Three Parts · by Dara Pearlman

Storing data on magnetic tape is an old technology. It's cheap, slow, and relatively simple. Standard Pascal, a language designed in the early 1970s when tape was the major storage medium, can handle sequential tape-style files with great ease. But when it comes to direct-access files that take full advantage of the speed of magnetic disk drives, Standard Pascal is at a loss.

However, IBM Personal Computer Pascal has a number of extra features or extensions that allow you to write programs using direct-access files. In this article, the last in this series on IBM Pascal, we will look at a number of extensions, including IBM Pascal's special file-handling features, and put them to work in a simple program.

Some Preliminaries. Before we plunge in, let's look at the way IBM Pascal classifies input/output files. Like Standard Pascal, it recognizes two kinds of files, which the manual calls "file structures." A file with a *binary* structure needs the Pascal *get* and *put* statements for input and output, and can take on any form desired by the programmer, ranging from a simple *file of integer* to a complex file made up of predefined records such as *file of inventory_record*. The second kind of file structure is a *file of text* or, in IBM Pascal lingo, an ASCII file. With this type of file you can use the Pascal *read*, *readln*, *write*, and *writeln* statements and can process whole lines at one time.

A second way of classifying files is by mode. Using the mode, your program can tell the operating system what kind of hardware is associated with your file. Modes come in three flavors: terminal, sequential, and direct. When the mode is terminal, the file is a keyboard, a CRT display, or a printer. When the mode is sequential, the file is on a cassette tape recorder or a disk drive. And when the mode is direct, the file is a direct-access file on a disk drive.

If you use system file names, such as Lpt1 for your printer or Input for the keyboard, IBM Pascal will set the file mode automatically to terminal. If you don't use a system file name, IBM Pascal will assume the mode is sequential. The only time you need to worry about setting the file mode yourself is when you want to create a direct-access file. We will learn how to do that a bit later when we examine our sample program in detail.

You can mix and match the file structures and file modes to get different effects. For example, you might normally think of a direct-access file as having a binary structure so that you could easily call up an individual record in, say, a personnel file. But you can also create a text file in direct-access mode, which would allow you to retrieve individual lines for processing one at a time.

Different Strokes. One very useful combination is the binary structure together with the terminal mode. This allows you to bypass the keyboard buffer and get single stroke input, just as IBM Basic does with the *inkey$* variable. Let's see how it's done.

Usually, when you write a program statement such as

PROGRAM SAMPLE (INPUT,OUTPUT)

IBM Pascal defines and opens an ASCII terminal file for the keyboard, named Input, and an ASCII terminal file for the display, named Output. Because the files have ASCII structure, they need a line marker or carriage return to mark the end of each line. And so, when you write an input statement such as

READLN (ANSWER)

the program will wait until you hit the enter key before actually reading the data from the keyboard.

However, if your program needs single stroke input for response to menu options, or for some other reason, you can create another file for your keyboard that has a binary structure and reads one character at a time. An example of this technique is the *implementation of keystroke* in figure 1 (page 93). Note that we define Display and Keyboard as *file of char*. This makes them binary files, which do not require a carriage return at the end of each line. Before we can use these files, we have to tell Pascal what kind of files they are, and we have to open them. That's the job of *procedure open_inkey_files*. The first statement

ASSIGN (KEYBOARD, 'USER')

is an example of the IBM Pascal *assign* procedure, which lets you give a DOS file name to a file variable. This is especially handy for system files that never change, such as Lpt1 for the printer, because the operator doesn't have to enter the file name at run time.

In our *assign* statement, we give our binary file Keyboard the system file name User, the name DOS recognizes for console input and output. Because DOS knows what kind of device User is, the statement also gives Keyboard a mode value of terminal. To finish our preparations, we reset the file to open it. Then we go through the same procedure for our file Display.

Now we're all set for a call to the function *inkey*, which will read a single stroke from the keyboard and write it on the display screen. *Inkey* begins with a polling loop, which continually examines the contents of the keyboard buffer until something other than the null character *chr(0)* appears. Then it writes the character on the display screen and assigns the character to the variable *inkey*, which will return to the calling routine as the result of the function.

You should be aware that IBM Pascal may get confused when

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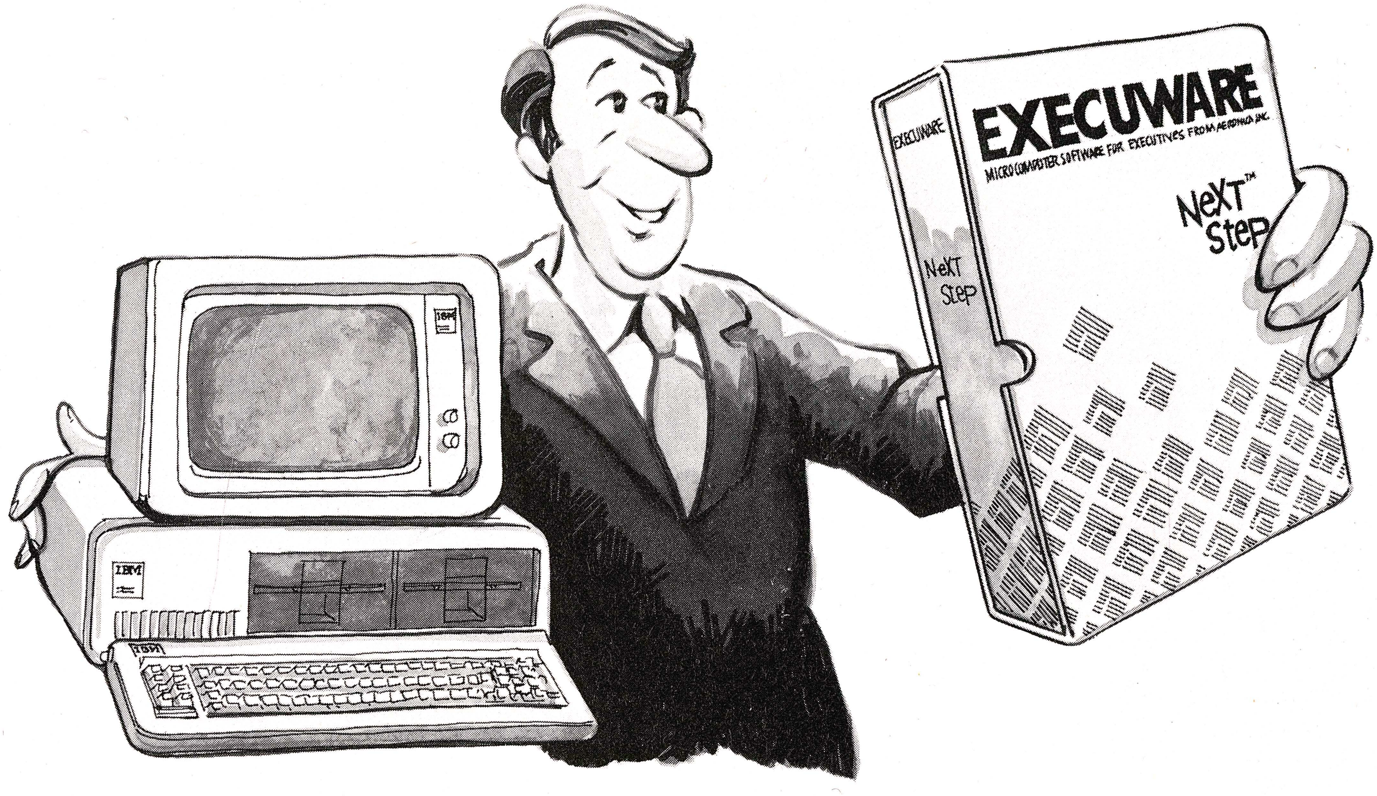
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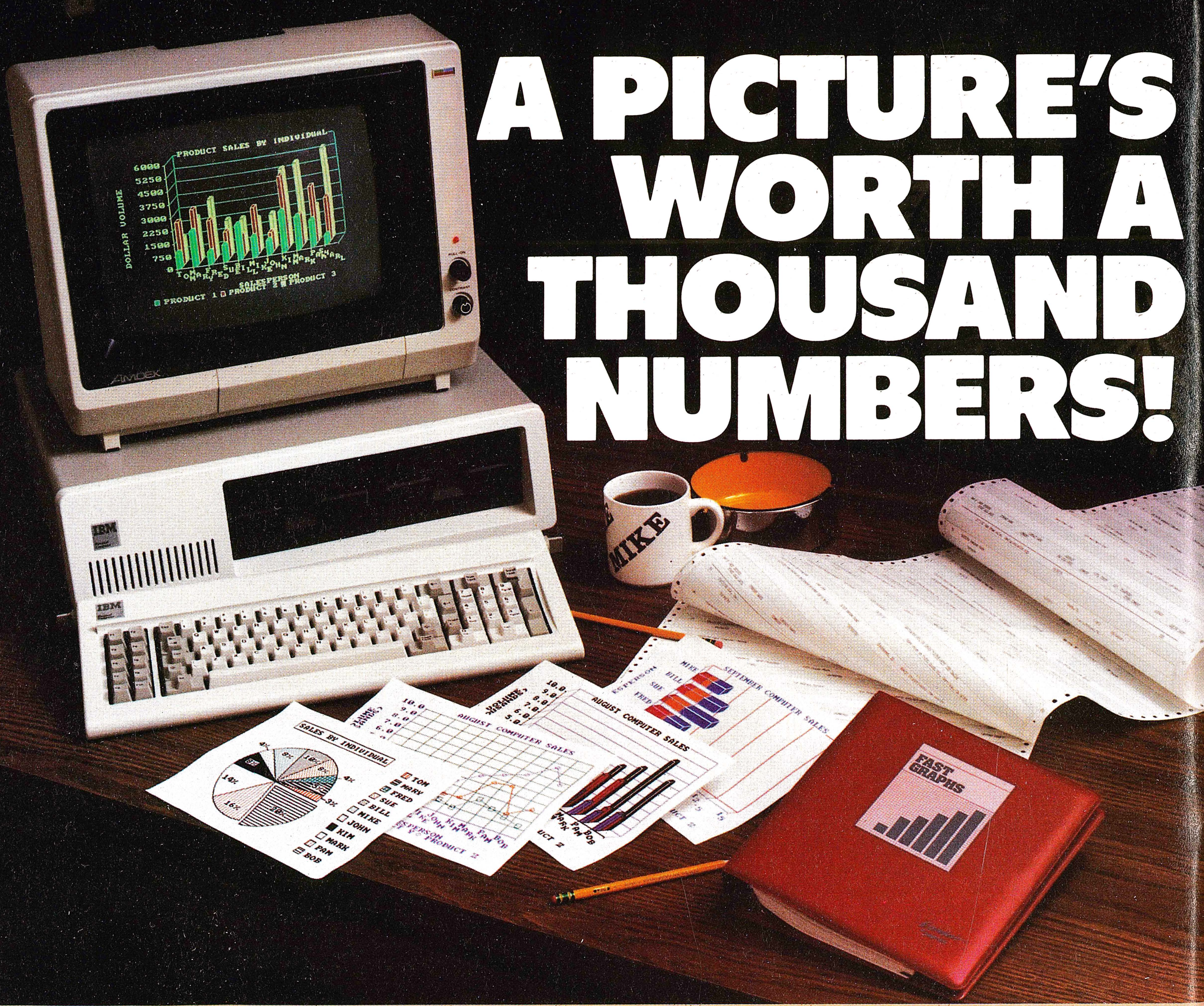
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```
(*$TITLE: 'KEYSTROKE IMPLEMENTATION'*)
(*$INCLUDE:'B:KEY.INT'*)
IMPLEMENTATION OF KEYSTROKE;
VAR
          DISPLAY,
          KEYBOARD:            FILE OF CHAR;
FUNCTION INKEY;
          BEGIN
                     REPEAT
                               GET(KEYBOARD)
                     UNTIL KEYBOARD^ <> CHR(0);
                     WRITE (DISPLAY,KEYBOARD^);
                     INKEY := KEYBOARD^;
          END;       (*INKEY*)
PROCEDURE OPEN_INKEY_FILES;
BEGIN       (*OPEN_INKEY_FILES*)
             ASSIGN (KEYBOARD, 'USER');
            RESET (KEYBOARD);
            ASSIGN (DISPLAY,'USER');
            REWRITE (DISPLAY);
END;         (*OPEN_INKEY_FILES*)
END.         (*IMPLEMENTATION*)
```

Figure 1

```
(*$TITLE: 'INTERFACE FOR KEYSTROKE'*)
INTERFACE;
          UNIT KEYSTROKE (INKEY, OPEN_INKEY_FILES);
FUNCTION INKEY: CHAR;
PROCEDURE OPEN_INKEY_FILES;
BEGIN     (*INTERFACE*)
END;      (*INTERFACE*)
```

Figure 2

you switch back and forth between binary terminal input and regular ASCII terminal input, and your program may ignore an instruction to *read* from Input. You can avoid such problems if you *reset* the standard Input file before issuing a call to *read*, as illustrated in *procedure find_record* in figure 3 (page 94).

Linking Up. When you examine the listing in figure 1, you may wonder about the *interface* and *implementation* declarations, and some other strange-looking code, like the appearance of *procedure open_inkey_files* in two separate places, and the lack of a function type in the definition of *function inkey*. This code is an example of an IBM Pascal extension that allows you to compile sections of a program separately. This feature is very handy for utility routines, such as *inkey*, that you might want to use in many programs. It also allows you to write programs that are larger than the compiler's limit of 64K for a single compiler run. You can simply compile your program in sections of 64K or less and then combine the sections using the Linker program.

This method of compilation requires three special declarations. One is the *implementation*, which is like a program without a body or a collection of procedures and functions. Note that the implementation can have global variables, such as the files Display and Keyboard, which are shared by the program and the implementation. The implementation ends with an *end* statement that doesn't match a *begin* statement.

Before you send the implementation to the compiler, you must precede it with an *interface*. Figure 2 is an example of an interface. Note that the reserved word *unit* is followed by the name of the implementation, and then the names of the implementation's functions and procedures enclosed in parentheses. We then repeat the names of the functions and procedures as if we were writing a *forward* declaration. For functions, you should include the function type, as we do with

```
FUNCTION INKEY: CHAR;
```

That eliminates the need to include the function type in the implementation.

Now you're ready to compile the implementation, which you would do with an ordinary compiler command line. If we named the implementation file Key.pas, the compiler command line would be:

```
A:PAS1 KEY,,;
```

When you write a program that will use the implementation, you need to add a *uses* clause to your program declaration, as illustrated in the program in figure 3. Since you also need to hook the interface to the beginning of your program as well, you might find it convenient to keep it in a separate disk file, such as Key.int, and use the metacommand *$include* at the beginning of both the implementation and the program.

You then compile your program and link the resulting object code with the object code from the implementation with a command line such as

```
A:LINK MAIN+KEY
```

IBM Pascal also provides a simpler method of compiling and linking separate portions of a program. However, although it is simpler, it may require some duplicate coding if you use global variables as we did in our example. The simpler method does not require an interface. Instead, you group the functions and procedures into a *module*, such as

```
MODULE KEYSTROKE [PUBLIC];
FUNCTION INKEY: CHAR;
(* Include body of function here. *)
PROCEDURE OPEN_INKEY_FILES;
(* Include body of procedure here. *)
END.
```

Note that, like the implementation, the module concludes with an *end* that doesn't match a *begin*. You can compile the module just like a program or an implementation, and then link it to a program. A program linked to a module must declare the module's procedures and functions as *extern*. For example, if your program called *inkey*, you would write the following declaration before the first call:

```
FUNCTION INKEY: CHAR [EXTERN];
```

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Now let's look at our sample program, *Personnel*, in figure 3, which illustrates how to use a direct-access data file. This program is a partial personnel record-keeping system. It uses a very simple employee record, defined in the *type* section as *personnel_type*, with two fields, *nbr* and *name*. We define our actual record in the *var* section as *pers_rec* and we define our data file as *pers_file*.

The main routine at the end of the program requests a file for processing, invokes a procedure to open the direct file, writes a menu, accepts single-stroke input via our *inkey* function and then,

```
(*$TITLE: 'DIRECT ACCESS EXAMPLE'*)
(*$INCLUDE: 'B:KEY.INT'*)

PROGRAM PERSONNEL (INPUT,OUTPUT);
          USES KEYSTROKE (INKEY, OPEN_INKEY_FILES);
LABEL
          CHOOSE_OPTION;
CONST
          TAB = CHR(9);
TYPE
          PERSONNEL_TYPE = RECORD
                     NBR:          BYTE;
                     NAME:              STRING(30);
          END;       (*RECORD*)
VAR
          PERS_FILE:            FILE OF PERSONNEL_TYPE;
          PERS_REC:             PERSONNEL_TYPE;
          CHOICE:               CHAR;
PROCEDURE WRITE_MENU;
BEGIN     (*WRITE_MENU*)
          WRITELN;
          WRITELN;
          WRITELN (TAB,TAB,'PERSONNEL PROGRAM OPTIONS');
          WRITELN;
          WRITELN (TAB,'I = INITIALIZE FILE');
          WRITELN (TAB,'E = EXAMINE RECORD');
          WRITELN (TAB,'A = ADD RECORD');
          WRITELN (TAB,'X = EXIT PROGRAM');
          WRITELN;
          WRITE (TAB,'Please enter choice..');
END;      (*WRITE_MENU*)
PROCEDURE OPEN_DIRECT_FILE;
BEGIN (*OPEN_DIRECT_FILE*)
          PERS_FILE.MODE := DIRECT;
          IF (CHOICE = 'I') OR (CHOICE = 'i') THEN
                     REWRITE (PERS_FILE)
          ELSE
                     RESET (PERS_FILE);
          (*To allow your program to handle error trapping, add here:
          PERS_FILE.TRAP := TRUE; *)
END;      (*OPEN_DIRECT_FILE*)
PROCEDURE INITIALIZE_FILE;
VAR
          I:         BYTE;
BEGIN     (*INITIALIZE_FILE*)
          FOR I := 1 TO 255 DO
                     BEGIN
                     PERS_REC.NBR := 0;
                     SEEK (PERS_FILE, I);
                     PERS_FILE∧ := PERS_REC;
                     PUT (PERS_FILE);
                     END;
END;      (*INITIALIZE_FILE*)
PROCEDURE FIND_RECORD  (VAR REQUESTED_NBR: BYTE);
VAR
          RAW_INPUT:    LSTRING(80);
          VALID_INPUT:  BOOLEAN;
BEGIN     (*FIND_RECORD*)
          VALID_INPUT := FALSE;
          REPEAT     (* Until Valid_Input *)
                     BEGIN
                     WRITELN;
                     WRITE ('Please enter employee number..');
                     (* Reset when switching from binary to text input *)
                     RESET (INPUT);
                     READLN (RAW_INPUT);
                     IF DECODE (RAW_INPUT, REQUESTED_NBR) THEN
                               VALID_INPUT := TRUE
                     ELSE
                               WRITELN ('Sorry, not a valid employee nbr.');
                     END;
          UNTIL VALID_INPUT;
          SEEK (PERS_FILE, REQUESTED_NBR);
          GET (PERS_FILE);
          PERS_REC := PERS_FILE∧;
END;      (*FIND_RECORD*)
PROCEDURE ADD_RECORD;
VAR
```

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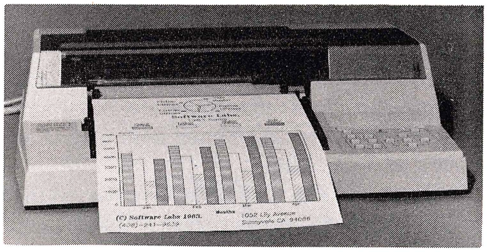

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```
            ANSWER:        CHAR;
            ADD_NBR:       BYTE;
BEGIN       (*ADD_RECORD*)
            FIND_RECORD (ADD_NBR);
            (* Check if record already exists *)
            IF PERS_REC.NBR <> 0 THEN
                        BEGIN
                        WRITE ('Record already exists. Replace it? Y/N..');
                        ANSWER := INKEY;
                        IF (ANSWER = 'N') OR (ANSWER = 'n') THEN
                                  RETURN;
                        END;
            (* Load PERS_REC with new data *)
            PERS_REC.NBR := ADD_NBR;
            WRITELN;
            WRITE ('Please enter employee name..');
            READLN (PERS_REC.NAME);
            (* Write record to file. Note that we
              need a second seek to reset file pointer *)
            SEEK (PERS_FILE, PERS_REC.NBR);
            PERS_FILE ^ := PERS_REC;
            PUT (PERS_FILE);
            WRITELN ('Record added for employee # ',PERS_REC.NBR);
END;        (*ADD_RECORD*)
PROCEDURE EXAMINE_RECORD;
VAR
            EXAMINE_NBR:            BYTE;
BEGIN       (*EXAMINE_RECORD*)
            FIND_RECORD (EXAMINE_NBR);
            WITH PERS_REC DO
                  BEGIN
                      IF NBR = 0 THEN
                               WRITELN ('No record exists for', EXAMINE_NBR)
                      ELSE
                         BEGIN
                               WRITELN ('Personnel Nbr = ', NBR);
                               WRITELN ('Name          = ', NAME);
                         END;
END;        (*EXAMINE_RECORD*)
BEGIN       (*MAIN ROUTINE*)
            OPEN_INKEY_FILES;
            WRITELN ('Please type in name of personnel file..');
            READFN (INPUT, PERS_FILE);
       CHOOSE_OPTION:
            REPEAT      (* Until choice = 'X' *)
                  BEGIN       (*REPEAT*)
                      WRITE_MENU;
                      CHOICE := INKEY;
                      IF (CHOICE = 'X') OR (CHOICE = 'x') THEN
                               BREAK CHOOSE_OPTION;
                      OPEN_DIRECT_FILE;
                      CASE CHOICE OF
                                'I','i': INITIALIZE_FILE;
                                'A','a': ADD_RECORD;
                                'E','e': EXAMINE_RECORD;
                                'X','x': (* No action *);
                      OTHERWISE
                                WRITELN;
                                WRITELN ('Sorry, do not know how.');
                      END;      (*CASE*)
                END;            (*REPEAT*)
            UNTIL (CHOICE = 'X') OR (CHOICE = 'x');
END.        (*MAIN ROUTINE*)
```

Figure 3.

using a *case* statement, takes one of five possible actions. You can see how this would look on the screen in the sample run in figure 4.

When the program asks for the name of the personnel file, it reads the name in via the IBM Pascal *readfn* statement. This is an alternative to the Standard Pascal requirement that demands the inclusion of the file name in your program statement, such as:

PROGRAM PERSONNEL (INPUT,OUTPUT,PERS_FILE);

If you use the standard method, DOS will prompt you for the DOS file name at the beginning of the program with a cryptic

PERS_FILE:

The *readfn* statement allows you to write your own prompt, such as our polite, "Please type in name of personnel file. . . ." You use *readfn* just like a regular *read* statement, using the input file and the variable desired as the operands.

Need a Break? Note that we have given the main processing loop a label, *choose_option*. IBM Pascal lets us use alphabetic labels, which are very handy for documenting the use of IBM Pascal's sequence control statements, *break*, *cycle*, and *return*. The *break* statement allows you to stop a loop, as we do when we check to see if the operator wishes to exit the program in our code:

IF (CHOICE = 'X') OR (CHOICE = 'x') THEN BREAK CHOOSE_OPTION;

The other two extensions also allow you to control program sequence without resorting to a *goto*. The *cycle* statement causes the loop to begin a new cycle, and the *return* statement stops a called routine and returns control to the calling routine.

```
(Sample run of PROGRAM PERSONNEL. Responses are in
boldface.)
Please type in name of personnel file..
    PERS.DAT
            PERSONNEL PROGRAM OPTIONS
         I = INITIALIZE FILE
         E = EXAMINE RECORD
         A = ADD RECORD
         X = EXIT PROGRAM
         Please enter choice.. I
                        (Menu repeated)
         Please enter choice.. A
         Please enter employee number.. 5
         Please enter employee name.. BLAISE PASCAL
         Record added for employee #      5
                        (Menu repeated)
         Please enter choice.. A
         Please enter employee number.. 5
         Record already exists. Replace it? Y/N.. Y
         Please enter employee name.. GEORGE  WASHINGTON
         Record added for employee #      5
                        (Menu repeated)
         Please enter choice.. E
         Please enter employee number.. 1
         No record exists for      1
                        (Menu repeated)
         Please enter choice.. E
         Please enter employee number.. 5
         Personnel Nbr =            1
         Name            = GEORGE WASHINGTON
                        (Menu repeated)
         Please enter choice.. X
```

Figure 4

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If the operator doesn't choose the exit option, the program calls *procedure open_direct_file*, which sets the file mode to direct in the statement

```
PERS_FILE.MODE := DIRECT;
```

Note that we use record notation, as if *mode* were a field in a record named *pers_file*. That's because IBM Pascal stores DOS-related file information in a record called the File Control Block or FCB. For a complete listing of the FCB, look at the interface file Filkqq.inc on your PAS1 diskette. You can use three of the FCB fields, *mode*, *trap*, and *errs*, without formally including the interface in your program. If you want to use any of the other fields, you should place the interface before your program statement by writing

```
(*$INCLUDE A:FILKQQ.INC*)
```

and adding the following *uses* clause after your program statement:

```
USES FILKQQ;
```

To use an FCB field, simply add the field name to the file name using Pascal record notation, as we did by writing *pers_file.mode*. The other two automatically declared FCB fields allow you to handle your own I/O errors if you want to bypass the DOS error-handling routines.

To use this feature you should set the *trap* field to *true*, as we note in the comment at the end of *procedure open_direct_file*. You should wait until after you open the file before initializing *trap* because a *reset* or a *rewrite* will automatically set *trap* to *false*. Then you can test the contents of the *errs* field after every I/O operation. A table of the *errs* return codes is on page A-38 of the IBM Pascal manual.

Opening the File. After we set the mode, we need to open the direct-access file. Our *procedure open_direct_file* will create the file with a *rewrite* statement if the operator has opted to initialize the file; otherwise it will attempt to open an existing file with a *reset* statement. For direct files, both *rewrite* and *reset* will allow you to write on the file.

In order to read from or write to our direct-access file, we need the IBM Pascal *seek* procedure, defined as

```
PROCEDURE SEEK (VAR F; N:WORD)
```

where F is a file variable and N is the record number. We call *seek* before every *get*, *put*, *read*, or *write*. Since our *pers_file* has a binary structure, we use *get* and *put* for the I/O operations in our sample program. If we were using an ASCII file, we could use *read* and *write* instead.

To see the *seek* in action, look at procedures *initialize_file*, *find_record*, and *add_record*. Note that to add a record, we call *seek* twice. The first time, in *procedure find_record*, the *seek* is followed by a *get*, so that we can check if the record already exists. The second *seek* resets the file pointer before a *put* writes the data to the file.

Editing Aid. *Procedure find_record* also illustrates another IBM Pascal extension that can help you edit raw input, the *decode* function. This useful tool can be hard to use because the documentation is a bit out of sync with its actual performance. According to the manual, the formal definition of *decode* is

```
FUNCTION DECODE (CONST S:STRING, VAR X:M:N):
BOOLEAN
```

where S is a string of characters and X is the decoded numerical equivalent of the string. The function returns a value of *true* if X is a valid number. M and N are supposed to act like the formatting parameters in the *write* procedure, with M defining the size of field and N defining the number of decimal places for a real number.

In practice, the compiler will slap your hand if your S parameter is a *string*, giving you error message 239, which demands an *lstring*. The compiler will also reject the M and N parameters. However, if you keep these limitations in mind, *decode* can keep your program from crashing if the operator enters alphabetic characters when the program is expecting numbers. In our program, we use *decode* to test the *lstring* variable *raw_input* to make sure it is a valid number before we use it as a record number in a call to *seek*.

Note that we don't bother to test for the end of file marker, EOF, before reading from or writing to our direct-access file. That's because EOF has no meaning in a direct-access file. Thus we must be careful to keep track of the size of the file on our own. In our example, the *decode* function will intercept any attempt to retrieve an undefined record, since we have initialized 255 records—the upper limit of *pers_rec.nbr*, which we have defined as a *byte* variable. However, if we initialized a lesser number, say 100 records, and then attempted to *seek* record number 101, the program would do our bidding and fetch garbage.

In Conclusion. As you can see, IBM Pascal extensions can plug up many of the holes in Standard Pascal and give your software the ability to exploit the potential of the IBM pc hardware. Some deficiencies in the manual and bugs in the compiler can make the learning process frustrating, but the effort is still worthwhile. And we can hope that IBM will plug up its own holes in future Pascal releases. ▲

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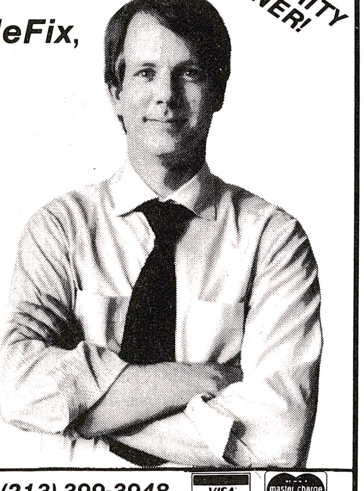

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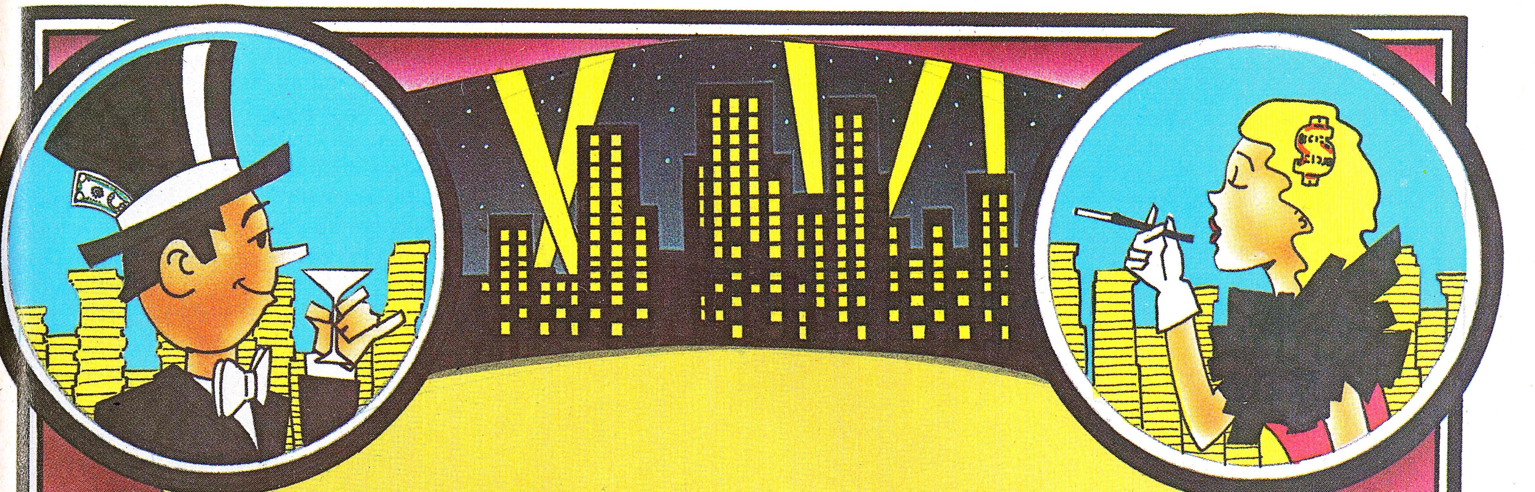

A PERSONAL FINANCE REVIEW

by Burton Alperson

Personal financial programs for the IBM pc present a bewildering variety of choices. Prices range from less than $40 to more than $200. Virtues claimed for the programs range from simple checkbook management to the ability to manage all financial and property transactions for a family or small business. Price seems to bear little relationship to features or quality. It is difficult to make comparisons among programs because there is little standardization of terminology. Advertisers are free to choose whatever language they wish in order to emphasize or hide characteristics of their programs.

The situation is unfortunate. When the terminological problems are cleared away and the programs are actually compared to one another, it turns out that there are a few basic operations called by many different names. While there is a great variety of "bells and whistles," this is an area in which you generally get what you pay for. The higher-priced programs usually have capacities that justify their cost. The task for the potential purchaser is to decide on the features desired and the maximum he or she is willing to spend.

This article compares five different personal finance programs. The programs vary in price from $34.95 to $195, and they contain most of the features currently available.

Before any meaningful comparisons can be made, it is necessary to establish a vocabulary. The terms accounts, automatic bill paying, automatic transactions, budget categories, check writing, graphic reports, interface with tax programs, multiple-item transactions, personal inventory, tax categories, and copy protection are useful in describing the operations of these programs. These may serve as criteria for the evaluation of programs. Table 1 (page 104) summarizes these features across the programs under review here.

Accounts. Many of the programs use a broader definition of this term than is typical in home use. While the terms checking accounts, savings accounts, and charge accounts are consistent with common usage, the term cash account is not. We shall refer to cash transactions rather than cash accounts in this article.

Automatic Bill Paying. Programs that contain this feature allow you to establish a list of bills you typically pay. When you are ready to pay your bills you are presented with the list and you indicate which bills are to be paid (you may pay a previously established amount, or alter the amount at will). The program then types your checks, adjusts your checkbook balance, and makes entries in the appropriate budget and tax categories. It is still necessary for you to sign the checks and mail them. (This feature should not be confused with check writing, which is a less powerful operation.)

Illustrations by Mike Cressy

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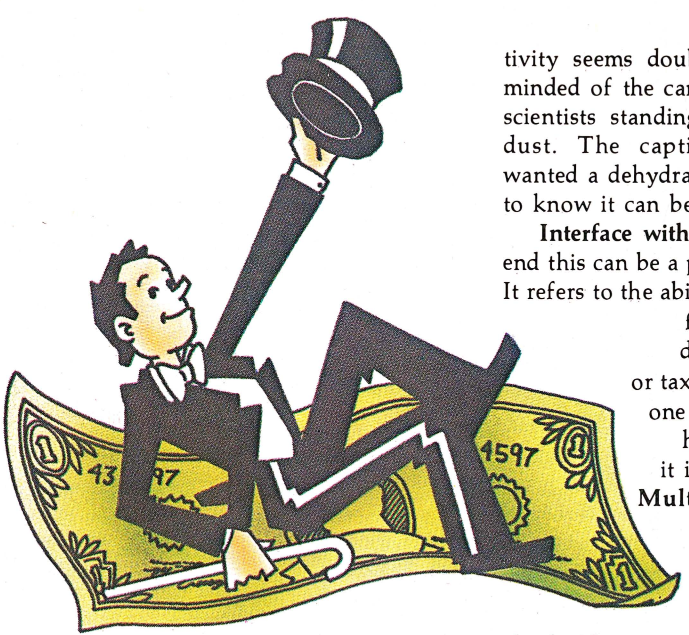

Automatic Transactions. Many financial transactions have now become automatic. An institution may subtract a mortgage payment or a car payment from your checking or savings account with no intervention on your part (other than an occasional moan). All the programs are capable of recording automatic transactions manually. You simply choose a check number you would not normally use (like 0) and enter it as you would enter any other check. The term "automatic transaction" is reserved here for those programs that have routines that make all adjustments when the appropriate date is passed. Such programs can deal with automatic deposits as well as automatic payments.

Budget Categories. All the programs allow you to define several budget categories (food, rent, entertainment, and so forth). Although categories may be suggested by the programs, you are free to set up whatever labels you desire. Some programs do not distinguish budget categories from tax categories. Using more budget categories means using fewer tax categories, and vice versa. The number of such categories ranges from a low of 12 to a high of 32,767.

Check Writing. Programs with this feature allow you to enter the information necessary to write a check. The program then types the check and adjusts your balance. It also makes appropriate entries to your budget and tax categories. (Advertisements may give the impression that this is the same thing as automatic bill paying; it is not.)

Graphic Reports. Some programs produce graphic representations of financial data. Although this capacity will be noted in this article, it will not be given any great emphasis. The usefulness of showing a regression line superimposed on a histogram of twelve months of checkbook activity seems doubtful at best. One is reminded of the cartoon of two white-coated scientists standing next to a huge pile of dust. The caption is, "Nobody really wanted a dehydrated elephant, but it's nice to know it can be done."

Interface with Tax Programs. At year's end this can be a particularly useful feature. It refers to the ability of a program to transfer all your financial data directly to tax preparation or tax modeling programs. Only one of the programs reviewed here has this capacity, and it is limited to tax modeling.

Multiple-Item Transactions. It is frequently useful to be able to itemize transactions that might all be covered by a single check. If you paid for disks, a printer, and chewing gum with a single check, this capacity would allow you to route each of these items to the appropriate budget and tax categories. This capacity is referred to as "split transactions" by some programs.

Personal Inventory. This capacity allows you to build a catalog of your possessions. Such a catalog can be useful for insurance, warranty, or tax purposes.

Tax Categories. All the programs provide some help with taxes. The weakest programs in this respect simply flag items as tax-related, or force you to define some of your budget categories as tax categories. Stronger programs provide tax categories that function independently from the budget categories. The range of available categories represented here is 1 (for flagging the transaction) to 32,767.

Copy Protection. Since, by their nature, financial programs require a great deal of disk activity, electronic disks and hard disks become very attractive modalities to speed up operations. Most copy-protection schemes prevent such use. Copy-protection greatly reduces the usefulness of one of the most powerful of the programs reviewed here. Since the decision to copy-protect a program has serious implications for legitimate users, it is listed in table 1 as a criterion for evaluation.

Other criteria, such as good program design, are important but more subjective and difficult to categorize. Programs that allow the user to avoid thought and keystrokes while entering data, for example, reflect good programming practice. It should not be necessary to define a new date and check number each time you enter a new check during a session. The check number should be incremented automatically, and the date should remain in force until changed. Considerations such as these will be discussed wherever relevant.

THE PROGRAMS.

Apparat Home Finance, by Bruce Deffler. This program is surprisingly powerful, especially in light of its low price. Two functionally equivalent programs are supplied on the distribution disk, one of which can be run on 64K systems, and the other of which is compiled and requires 128K.

Home Finance is a basic checkbook program. It can deal with one checking account with up to about 2,200 transactions on a single-sided disk. Twelve user-defined categories are allowed for both tax and budget purposes. Each of these categories may contain up to four subordinate categories. This hierarchical structure greatly increases the power of the program. For example, instead of defining a single tax category for computer expenses, one might set up a business expense category that contains subcategories of computer expenses, small tools, books and supplies, and professional journals.

Although the written documentation is a bit on the skimpy side, the program itself is well designed. Menus are generally clear and logically sequenced. The check entry routine (figure 1) is the easiest and best of any of the programs under review here. Check numbers are incremented automatically, and the date remains in force until changed. The check number, date, and a running balance are always on the screen for reference during data entry. Information may be retrieved by check number, payee, or category. The time frame for retrieval of information may be between any two dates or year-to-date. A budget summary report is also provided.

This program is an outstanding value for those interested in a basic checkbook management program that can be of some help in budgeting or tracking tax-related expenses. It is worth noting, in addition, that Apparat seems quite concerned with customer support. A minor bug turned up during testing of the compiled version. A telephone call to Apparat resulted in a return call from the company with a fix within two hours. They were unaware that the call was from a reviewer. This is apparently their normal way of doing business.

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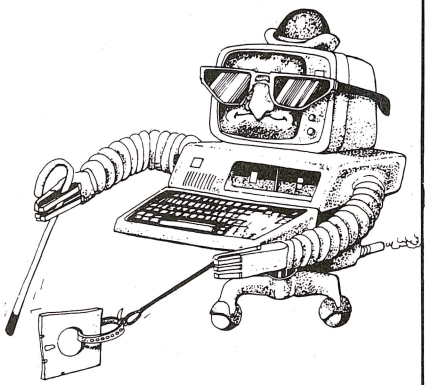

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Perfin, by Digital Engineering Group. *Perfin* provides capacities beyond simple checkbook management. It allows forty categories that can be used to manage credit cards, mortgage payments, loan payments, cash transactions, and so on. Since budget and tax categories are also drawn from this pool of forty categories, you may need to take some care in setting up your strategy. The program can manage a single checking account, and a single-sided disk can hold about forty-three hundred transactions.

The on-screen menus and manual are excellent. All routines are invoked by the pc's function keys. The program has well-designed error-trapping routines, and it is difficult to make a catastrophic mistake. In addition, an interesting, easy-to-use routine is provided for keeping track of accumulated state sales tax. A prompt for each entry asks if the purchase involved sales tax. If it did, you may respond with the amount of sales tax or simply enter the tax rate and allow the program to calculate and enter it. The feature is unique among the programs tested here.

On the other hand, the data entry routine (figure 2) is unnecessarily clumsy and tedious. Each entry requires one to enter the date and check number. Since there is no running balance, check number, or date on the screen, it is easy to lose your place and enter the same transaction twice, or to skip a transaction entirely.

Information may be retrieved by check number, date, and "index" (i.e., record number). It is not possible to retrieve a transaction by payee. Reports provided include a complete monthly account detail report (all transactions), a monthly account summary report (all balances and accumulated sales tax), a monthly report for any given category, and a monthly budget report that includes a bar chart comparison of categories.

Perfin allows multiple items per transaction. However, it is necessary to enter a separate editing routine called Update to accomplish this operation. Multiple-item entry is not a part of the normal data entry routine.

For a moderate increase in price, *Perfin* allows a substantial increase in the number and type of accounts that can be managed. With some reservations about the data-entry routine, the program can be recommended as a reasonably priced route to this increase in power.

PC/PFP, by Kenneth B. Petersen. *PC/PFP* can deal with one checking account with up to about twenty-four hundred transactions on a single-sided disk. Although the manual describes two strategies for dealing with more than one checking account, only one account is completely supported by the program.

In addition to thirty-eight expense categories, *PC/PFP* allows five income categories, two categories for credit card management, and nine tax categories. The tax categories function independently from the other categories. In addition to simplifying one's tasks at tax time, this independence also means that it is not necessary to sacrifice expense or budget categories to track tax expenses.

The manual is excellent. It is well written and filled with helpful examples. In addition, the program comes with a demonstration disk that contains twelve months of financial data and allows new users to get a quick overview of all functions without the necessity of trial-and-error data entry.

The data entry routine (figure 3) requires manual entry of each check number, but it keeps the date in force until changed. Multiple items for a transaction (split transactions) are easily handled within the data entry routine.

Information may be retrieved by expense category or tax category. The time frame for expense category reports may be for the current month, current year to date, a prior month, or a prior year. Tax category reports may be generated for the current month, current year to date, or a prior year.

The program includes a summary report called "Income, Expense, and Budget Summary." This format is particularly impressive. It includes monthly activity across all income and expense categories for a twelve-month period. Graphic displays include bar graphs for cash flow, budget performance, expense categories, and checkbook balance.

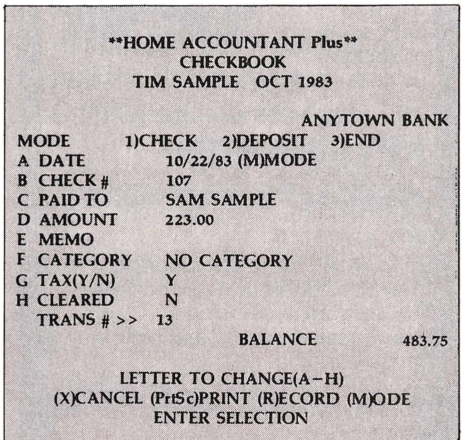
The program has no routines to search for individual items. Checkbook activity may be seen only month by month. It is impossible to retrieve transactions by date, check number, or payee.

PC/PFP is a professional, well-designed program. Its strongest features are customer support (Best Programs has announced a company policy to respond to all telephone inquiries within twenty-four hours) and the usefulness of its report formats for budget planning. Its major weakness is the lack of search routines for individual items.

Home Accountant Plus, by Mike Farmer, Larry Grodin, Stephen Pollack, and Robert Schoenburg. *Home Accountant Plus* can accommodate up to five independent checking accounts with up to about one thousand transactions on a single-sided disk.

The program allows up to one hundred budget categories on a 64K machine with single-sided drives. If the computer has at least 96K and either double-sided drives or a hard disk, 200 budget categories are allowed. Separate tax categories are not allowed; tax-related transactions may only be flagged.

The data entry routine (figure 4) is more complex and time-consuming than the routines in the programs described previously. On the other hand, the payoff in the amount and variety of report formats is substantial. The routine itself keeps the last date in force until changed, check numbers are incremented automatically, and running balance is constantly on the screen. Additional information on the data-entry screen includes payee, amount, space for a memo, budget category, and whether or not the tax flag has

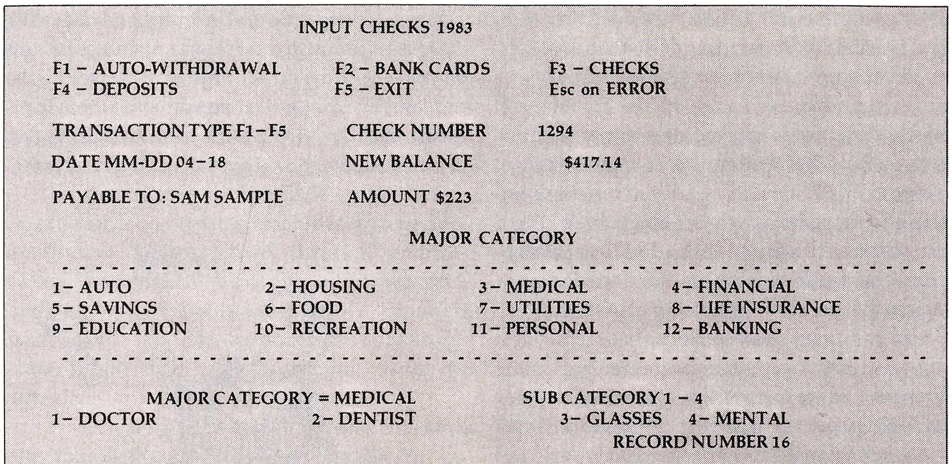


```
              **HOME ACCOUNTANT Plus**
                    CHECKBOOK
              TIM SAMPLE   OCT 1983

                                    ANYTOWN BANK
MODE         1)CHECK   2)DEPOSIT   3)END
A DATE           10/22/83 (M)MODE
B CHECK #        107
C PAID TO        SAM SAMPLE
D AMOUNT         223.00
E MEMO
F CATEGORY       NO CATEGORY
G TAX(Y/N)       Y
H CLEARED        N
   TRANS # >>   13
                              BALANCE          483.75

              LETTER TO CHANGE(A-H)
   (X)CANCEL (PrtSc)PRINT (R)ECORD (M)ODE
                 ENTER SELECTION
```

Figure 4. Data-entry screen for *Home Accountant Plus.*



```
                          INPUT CHECKS 1983

 F1 - AUTO-WITHDRAWAL        F2 - BANK CARDS        F3 - CHECKS
 F4 - DEPOSITS               F5 - EXIT              Esc on ERROR

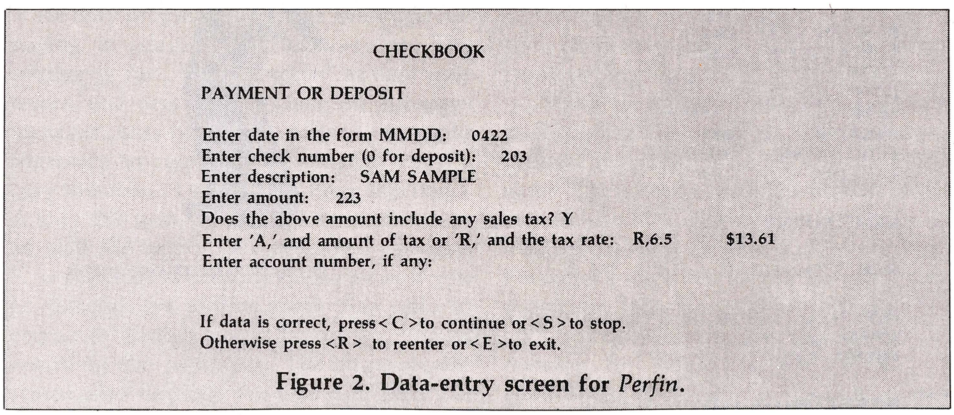
 TRANSACTION TYPE F1-F5      CHECK NUMBER       1294

 DATE MM-DD 04-18            NEW BALANCE          $417.14

 PAYABLE TO: SAM SAMPLE      AMOUNT $223

                              MAJOR CATEGORY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 1- AUTO            2- HOUSING          3- MEDICAL         4- FINANCIAL
 5- SAVINGS         6- FOOD             7- UTILITIES       8- LIFE INSURANCE
 9- EDUCATION      10- RECREATION      11- PERSONAL       12- BANKING
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          MAJOR CATEGORY = MEDICAL              SUB CATEGORY 1 - 4
 1- DOCTOR                  2- DENTIST              3- GLASSES    4- MENTAL
                                                        RECORD NUMBER 16
```

Figure 1. Data-entry screen for *Apparat Home Finance.*



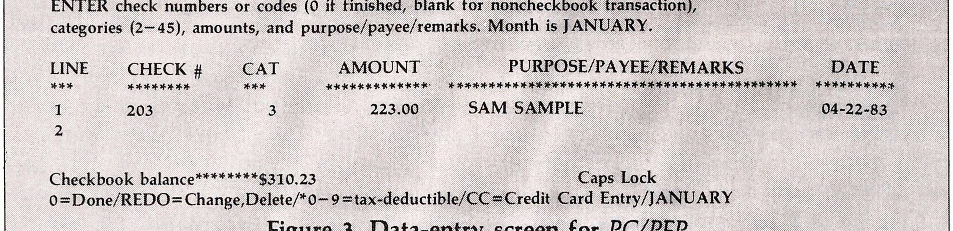
```
                          CHECKBOOK

         PAYMENT OR DEPOSIT

         Enter date in the form MMDD:   0422
         Enter check number (0 for deposit):   203
         Enter description:    SAM SAMPLE
         Enter amount:    223
         Does the above amount include any sales tax? Y
         Enter 'A,' and amount of tax or 'R,' and the tax rate:   R,6.5        $13.61
         Enter account number, if any:


         If data is correct, press< C >to continue or< S >to stop.
         Otherwise press <R>  to reenter or< E >to exit.
```

Figure 2. Data-entry screen for *Perfin.*



```
ENTER check numbers or codes (0 if finished, blank for noncheckbook transaction),
categories (2-45), amounts, and purpose/payee/remarks. Month is JANUARY.

LINE    CHECK #    CAT      AMOUNT         PURPOSE/PAYEE/REMARKS              DATE
***     ********   ***   *************  ******************************************  *********
1       203          3         223.00    SAM SAMPLE                          04-22-83
2

Checkbook balance********$310.23                          Caps Lock
0=Done/REDO=Change,Delete/*0-9=tax-deductible/CC=Credit Card Entry/JANUARY
```

Figure 3. Data-entry screen for *PC/PFP.*

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been set. Multiple-item transactions are possible in the entry routine, but clumsy to implement (a special category format using the word ''split'' must be used, along with some other rules that must be kept in mind).

Home Accountant Plus has the strongest search routines of any of the programs under review here. Individual transactions may be retrieved by date, check number, payee, amount, budget category, or memo. Multiple-search criteria may also be used (find all checks made out to John Smith for car repairs).

This is the only program reviewed here capable of completely automatic transactions. Up to five such transactions may be defined for each account. As soon as the programmed date is seen by the program, all appropriate actions are carried out with no further user intervention.

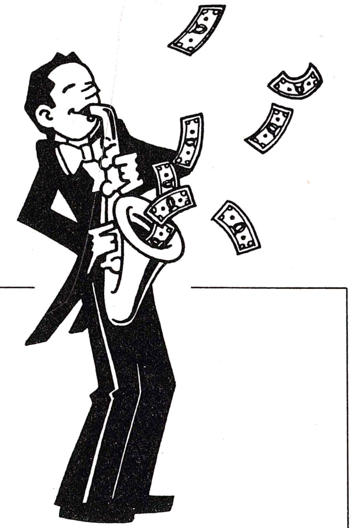
Check writing is also supported on specially printed checks. The check writing routine is straightforward and easy to use.

Available report formats include a year's budget or actual activity, balance sheet, net worth statement, income and expense summary, and activity reports for each budget category. Balance sheets and income and expense summaries may also be generated in a comparative format that displays differences between different time periods. A variety of graphic reports is also available.

In summary, *Home Accountant Plus* is a powerful package for management of home finances. Its strengths lie in its capacity for managing several accounts, its data retrieval and report capability, check writing, and the ability to manage automatic transactions. Its weaknesses lie in its inability to define more than one tax category, and in its time-consuming data-entry routine.

Financier Personal Series, by Financier, Inc. Because of its design, limits on criteria such as number of accounts, budget categories, tax categories, income categories, and number of transactions in this program can only be approximate. The total number of these criteria cannot exceed 32,767. One worst-case analysis suggested by the manual is that the program could easily deal with 400 accounts and categories with about twenty-four hundred transactions on a double-sided disk (1,500 transactions is the suggested limit for single-sided disks). Suffice it to say that the program provides greater capacity than most families are likely to need.

Like the data entry routine for *Home Accountant Plus*, the entry routine for the *Financier Personal Series* is more complex and time-consuming than the routines for less powerful programs. Figure 5 shows two screens in the entry routine for this program. While the check number is incremented automatically, the date always re-



```
BANK ACCT CD     CK1
CHECK OR ID#     1430
DATE              04-22-83
ITEM                1
MEMO             SAM SAMPLE
AMOUNT           223
BUDGET CODE      MED
TAX CODE         DMED

ITEMIZATION TOTAL IS                    $223.00

MORE ITEMS (Y/N)                                      DO NOT REMOVE DATA DISK

NEW BALANCE AFTER THIS TRANSACTION FOR:
AMERICAN SAVINGS CHECKING               $1216.03
CREDIT LIMIT                               $0.00

BUDGET UPDATE AFTER ITEM 1 FOR:
MEDICAL & DENTAL
BALANCE                          -$1536.00
ALLOTMENT                            $1.00
PERCENT USED                 %153700
SPENT YTD                         $1536.00

TAX SUMMARY UPDATE FOR:
MEDICAL & DENTAL
SPENT YTD                         $1536.00

PRESS ANY KEY TO CONTINUE                             DO NOT REMOVE DATA DISK
```

Figure 5. Two data-entry screens for *Financier Personal Series*.

verts to the current date rather than the last date entered. Multiple-item transactions are completely integrated into the data-entry routine. To indicate multiple items, it is only necessary to respond Y to the MORE ITEMS prompt. The program then branches to a fully prompted entry procedure for multiple items.

Once defined, budget and tax categories function independently. As shown by the second screen in figure 5, the data-entry routine automatically produces a summary status report for these categories.

The entry routine deserves special comment. While some users will find the program author's choices to their taste, others will find them to be irritating. The entry screens are completely prompted, and the prompts are sufficiently detailed to make it unlikely that data will be improperly entered. Each set of choices is followed by an option to record or abort the transaction. The advantages of this procedure are that the program is easy to learn to use, and once the data are entered, one may be reasonably confident that they are accurate. The disadvantage is that data entry is more time-consuming than it might otherwise be.

Documentation for this program is excellent. The manual includes a reference section, a well-designed tutorial, and detailed examples of strategies one might employ to set up personal systems for finances and taxes. The distribution disk contains data to be used in conjunction with the tutorial.

It is clear that *Financier Personal Series* is the most sophisticated and flexible of the programs under review here. Many of its features are both unique and desirable. This is the only program capable of automatic bill paying in addition to check writing. The routine is fast, well protected against user errors, and easy to use. Once the autopayment accounts have been defined, it is only necessary to respond to each item with Y (pay this item as is), N (don't pay this item), A (pay this item, but change the amount), or M (edit the entry). One additional response, K, is provided to keep previous entries if you go through the routine more than once to correct or change entries before printing or recording the payments. The autopayment screen also displays the last date each bill was paid.

This is also the only program containing full personal inventory routines. The inventory contains item descriptions, memoranda, locations, purchase prices, current values, and dates of purchase. Inventory data may be retrieved by description or location. The total value of the inventory may also be listed. While the data-entry routine includes a prompt that allows one to branch to the inventory routine, this procedure requires disk swapping and is too clumsy to be used frequently. Inventory entry can be invoked from the main menu and is much easier to use this way.

A great deal of thought obviously went into the design of the user interface in this program. For example, if you attempt to use a tax or budget category that has not been defined previously, you are not only prevented from using it but you are immediately offered the option of seeing all defined categories, reentering the code, or defining a new category. After you have exercised one of these options, you are returned to where you were when you attempted to enter the nonexistent category. When you later examine your list of categories, you will find that any newly defined categories have been entered and the whole list has been realphabetized to accommodate the new items.

Search routines for individual transactions are weak. Items may be retrieved only by "index." This index is either the check number or the date on which the transaction took place. You must choose the type of indexing at the time the system is set up; it cannot be changed without your setting up a new system. Thus, individual items may be retrieved by date or check number, but not both. It is not possible to retrieve a transaction by searching for the payee.

Reports, on the other hand, are quite detailed. One may generate reports listing all transactions for each bank account, budget category, tax category, and income category. Summary reports across all bank accounts, budget categories, tax categories, and income categories are also available.

Financier Inc. has just released a tax-modeling program. Data from the *Financier Personal Series* may be transferred directly to this program with no need for manual reentry.

While this program is quite easy to use, its flexibility and power are likely to have the greatest appeal for relatively sophisticated pc users. These are the people who will be concerned with hard disks, electronic disks, and macroprocessing capability. Unfortunately, Financier's decision to use Dysan's copy-protection scheme prevents many such applications. The company indicates that the revision for DOS 2.0 will allow these applications and that there will be a liberal update policy for purchasers of the current version.

Caveat Emptor. The programs that were excluded from this report merit some comment. One such program, written in the UCSD p-system, ran so slowly that it was faster to do all work by hand rather than on the computer. While the promotional literature indicated that the program could be used with an "IBM/Epson Printer or Letter Quality Printer," it would not operate with a

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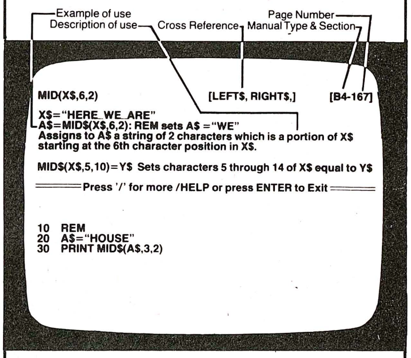

```
MID(X$,6,2)                    [LEFT$, RIGHT$,]     [B4-167]

X$="HERE_WE_ARE"
A$=MID$(X$,6,2): REM sets A$ ="WE"
Assigns to A$ a string of 2 characters which is a portion of X$
starting at the 6th character position in X$.

MID$(X$,5,10)=Y$  Sets characters 5 through 14 of X$ equal to Y$

=======Press '/' for more /HELP or press ENTER to Exit=======


10  REM
20  A$="HOUSE"
30  PRINT MID$(A$,3,2)
```

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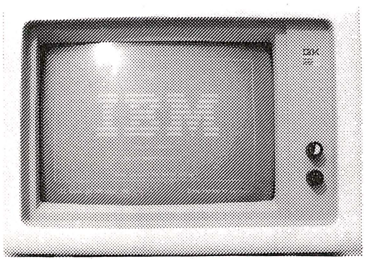
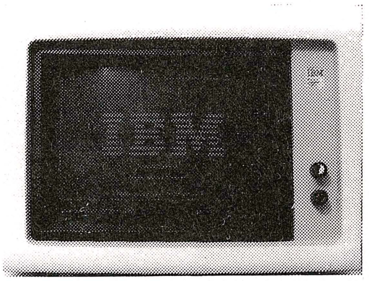


FROM THIS
TO THIS



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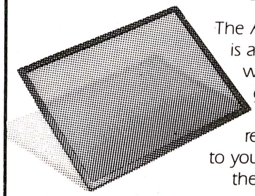

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A second program, written in Basic, was designed in such a way that the computer would stall frequently for two or three minutes while Basic ran through a garbage-collection routine. The documentation made no distinction between DOS 1.00 and DOS 1.10, but it soon became clear that the program was written for the older DOS and not updated. Although the program itself had been through several revisions, the manual had never been revised and reprinted. The documentation bore little correspondence with the version of the program supplied.

While there are obviously home financial programs on the market that are quite good, there are probably even more that resemble these two programs. This is one area where potential purchasers should make every effort to get a return privilege on software. If this is impossible, it would be wise to get a thorough hands-on demonstration, preferably using about three months of your own financial data.

An interesting generalization emerges with respect to the programs that are reviewed here. It seems that program authors have paid more attention to output than input. Reports are generally quite detailed, well laid out, and contain just about all the information users are likely to require. Data-entry routines, on the other hand, are clumsy, slow, and they frequently require the user to enter or reenter data that should be handled automatically (account name, date, check number, for example). This is particularly true of the more powerful programs (*PC/PFP*, *Home Accountant Plus*, and *Financier Personal Series*). Program authors would do well to consider including options like configuration files or macro-definition capability in future revisions. Such options would ease the data-entry burden considerably by allowing individual users to customize the programs to their own habits and tastes.

Overall, it appears that there are well-designed programs available to meet the needs of a broad range of pc users. If your only goal is to maintain your checkbook on your computer, *Apparat Home Finance* is an outstanding value.

On the other hand, if you feel your needs might require more power in the future, it would be wise to consider the most powerful program you can afford. There seems to be a strong relationship between price and power among these programs, but there is little penalty in terms of increasing effort with increasing power. It is not necessary to take advantage of all the "bells and whistles" of the more powerful programs. One may begin to use them only as the need is felt. Moving to a new program when you outgrow an old one involves considerably more than simply learning new syntax. It may involve revising the way you think about your finances. It is much easier to grow into a program than to change programs. ▲

Apparat Home Finance, by Bruce Deffler, is available from Apparat, Inc., 4401 S. Tamarac Parkway, Denver, CO 80237 (303-741-1778) for $34.95.

Perfin, by Digital Engineering Group, is available from Digital Engineering Group, 11999 Katy Freeway, Suite 150, Houston, TX 77079 (713-531-6100) for $65.

PC/PFP, by Kenneth B. Petersen, is available from Best Programs, Box 2370, Alexandria, VA 22301 (703-549-3663) for $95.

Home Accountant Plus, by Mike Farmer, Larry Grodin, Stephen Pollack, and Robert Schoenburg, is available from Continental Software, 11223 S. Hindry Avenue, Los Angeles, CA 90045 (213-410-3977) for $150.

Financier Personal Series, by Financier, Inc., is available from Financier, Inc., 11 Flanders Road, Westboro, MA 01581 (617-366-0950) for $195.

PRICE:	Apparat Home Finance $34.95	Perfin $65.00	PCP/PFP $95.00	Home Accountant Plus $150.00	Financier Personal Series $195.00
CRITERIA;					
Number of checking accounts	1	1	1	5	many
Number of checks/160K disk	2,200	4,300	2,400	1,000	1,500
Automatic bill paying	N	N	N	N	Y
Automatic transactions	N	N	N	Y	N
Budget or tax categories	12 (+48)	40	38B/9T	100B/1T	<32,767
Check writing	N	N	N	Y	Y
Interface with tax programs	N	N	N	N	Y
Multiple-item transactions	N	Y	Y	Y	Y
Personal inventory	N	N	N	N	Y
Copy protection	N	N	N	N	Y
MINIMUM HARDWARE:	64K 1 Single	64K 1 Single	64K 1 Single Printer	64K 2 Single Printer	64K 2 Single Printer

Table 1. Feature comparison of five personal finance programs.

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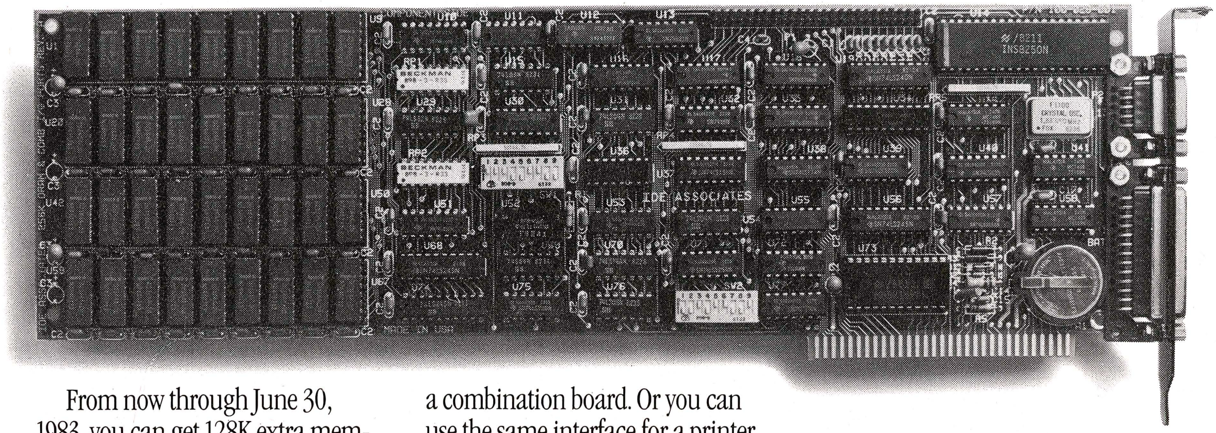

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Happiness is the PRINT USING Statement

by Donald B. Trivette

What's wrong with Basic, anyway? Just the other day I read a review of yet another word processing program: "The entire program is written in Microsoft Basic!" complained the reviewer. "This is unheard-of for a word processor. . . ."

Now he tells me.

There I was with my new pc—disk drives by Tandon, add-on memory chips from Apparat, a letter-quality printer—and no software. No word processing program. How was I to know it was unheard-of to write a word processor in Basic? It wasn't that I didn't want to spend the two or three hundred dollars for one of the commercially written programs; it *was* that I didn't want to spend two or three hundred dollars for a program I didn't like.

I don't like function keys. I don't like menus. I'm normal in other respects—I like apple pie, Mom, and Chevrolets—but function keys are a hassle and menus belong in restaurants. My main objection to the function keys is that I can never remember what key does what. Is it F3 or F5 that gets me a listing? While I'm figuring that out, and repairing the damage I've done by figuring wrong, I could have typed *list* a dozen times. (I can type; I've always suspected those who write word processing programs can't.) Hell, I could have typed L two dozen times.

My word processor would be different, I decided. No menus. No function keys. Either *list* or *L* to list and *delete* or *D* to erase, and to make it really friendly both upper and lower case would be acceptable. Having made those profound decisions, I was ready to tackle the question of whether to number each line of text or figure out some full-screen-editor scheme. I'm accustomed to line numbers. Basic uses line numbers; the IRS uses line numbers; football uses line numbers. I'm conditioned to relating the position of something to a line number. Each line of text could be an element of an array—no, every tenth element of the array—and then I could use the intervening slots for inserting lines. The program began to take shape.

It's amazing what you learn when you write your own word processor. For example, I tried storing one line of text in A$(10)—I was never imaginative with variable names—and successive lines at A$(20), A$(30), and up, leaving A$(11), A$(12), and so on, set to the null string (""); I quickly found out that there was a slight but noticeable pause when I listed the array. Skipping over nine intervening null strings takes time. I fixed that by numbering by fives instead of tens.

The next problem wasn't so easily solved. I wanted to be able to enter blank lines in the text. That seemed simple enough. But no matter what I did, I couldn't get the *line input* statement to distinguish between a line with a space (a blank line) and a null line. *Line input* was determined to make nulls of my blank lines. Surely, somewhere deep in the bowels of Basic was the answer.

I stopped work on the word processing program and wrote a program to display a hexadecimal dump of memory. By typing a "unique" series of characters and dumping the memory, I figured I could find the keyboard buffer. Maybe then I could figure out the internal difference between a null line and a blank line. Eventually I *did* find the keyboard buffer at address 1050, and eventually I devised a scheme to distinguish between nulls and blanks. (Much later I found the same address on page I-7 of the Basic manual.) Here's the code I came up with.

```
100  IB=PEEK (1050):IF IB=60 THEN
     IB=28
110  LINE INPUT B$
120  IE=PEEK(1050)
130  IF B$="" THEN IF
     ABS(IB-IE)=2 THEN B$=""
     ELSE B$=SPACE$(1)
```

By now the guts of the program were up and running and I was adding new commands at the rate of one a day. *List, load, save, find, delete,* and *end* were a breeze. *Copy* and *move,* while quite similar, were tricky because there might not be enough open slots (null elements of the array) into which to *move* or *copy* the block of text. After a few days, I came up with a method to renumber enough lines below the destination to have room for the source lines. With renumbering fresh in my mind, I thought a general *renum* command would be a snap.

The *renum* command was a bitch. My first thought was to *save* the file to disk and renumber as it was loaded. That would be easy but would take fifteen to twenty seconds. Word processors should do everything instantly—no pause, no wait. I tried a plan that moved everything to the top of the array—squeezed out the null lines—and then refilled the array from the bottom by increments of five. That didn't work. I've forgotten why. Next I tried moving everything to the bottom of the array and refilling the array from the top down. That did work. As I thought about it, I couldn't see why bottom to top would be any different than top to bottom. Had I stumbled on some secret known only to *renum* writers? ("Always do it bottom to top," Dummy. "Even Archimedes knew that!") For whatever reason, *renum* worked fine.

I made a giant file by repeatedly using my *copy* command. Then I typed *renum.* Seconds ticked by . . . ten, twenty, thirty . . . damn! It worked fine with small files.

This is how I learned what page 4-104 of the Basic manual meant. According to the manual, "Basic automatically does a housecleaning when it is running out of usable work area. . . . Be patient: Housecleaning may take a while." A while? Ha! I could clean my bathroom quicker. It took four minutes to do its dusting and renumbering of my three hundred lines! Any time you assign one

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character string to another (A$=B$), Basic assigns a new address to the target variable. What with moving lines to the bottom and back to the top, my *renum* command did lots of assignments.

I admitted defeat (*renum* isn't all that important anyway) and used the method of writing the file to disk and renumbering as it's loaded. I still think there must be some nifty way to manipulate the array index numbers in assembly language to renumber without moving anything. Or maybe the Basic compiler doesn't keep house. I haven't given up.

The *change* command was interesting. The idea was to change one character string to another either in a specific line, a range of lines, or throughout the text. The old-character string and the new-character string must have delimiters—programmers call them metacharacters—to distinguish one from the other. So *change 50 /test/text/* would change "test" in line 50 to "text." The /s are the metacharacters. Half the work was already done by the code in the *find* command. I thought it would be nice if the new-character string (the replacement characters) appeared on-screen as intense white. Blinking white was *too* much.

This is how I learned about the strange way the Basic *print* statement works. To display a line with part of the words highlighted, I had to use five statements—three of them *print* statements: (1) a *print* statement for the first part of the line; (2) a *color* statement to set high-intensity white; (3) a *print* statement for the new-character string; (4) another *color* statement to get back to regular white; and (5) a third *print* statement to print the remainder of the line. In Basic it might look like this:

```
PRINT A$;
COLOR 15,0
PRINT B$;
COLOR 7,0
PRINT C$
```

The semicolons after the print statements tell Basic not to do a carriage return after printing (good, just what I want)—unless the number of characters to be printed exceeds the number of character positions remaining on the line (oops!). If A$, B$, and C$ are all fifty characters long, then the *print* statement won't print one right after the other. It will instead print A$, B$, and C$ on three separate lines. That doesn't look good.

I found happiness in the *print using* statement. It does *not* do a carriage return when there isn't enough space left on the line. It wraps from one line to the next. My five statements became:

```
PRINT USING "&";A$;
COLOR 15,0
PRINT USING "&";B$;
COLOR 7,0
PRINT USING "&";C$
```

I added a couple more commands to my word processor and decided I'd better get to the *print* command before I ran out of storage. My pc has only 64K; Basic and the system stuff takes up more than half of that. New commands were fun to add, but I had to leave some room to store the text, and a *print* command is an absolute must for a word processor; without it you've only got a text editor.

The *print* command uses commands embedded in the text to control formatting. This is the way *Script*, a text-formatting program for large computers, works, and I've used *Script* for years. I like it. My embedded commands, like *Script*'s, start with a period in the first column. (Does this violate their copyright?)

.Fo on and *.fo off* control word movement. Once *.fo* (for *fo*rmat) is turned on, as many words as necessary are moved to fill a print line. *.Rj on* and *.rj off* control right justification.

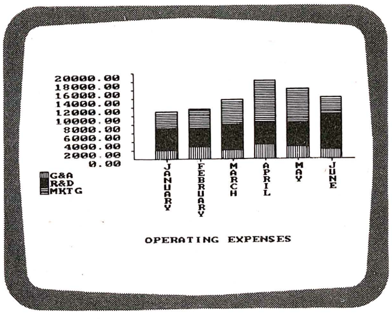
My printer is a NEC 3550 and is smarter than most microcomputers were a few years ago. To right-justify text, give it a command and it figures out where and how many spaces to insert. It doesn't even insert full spaces—it automatically adds or subtracts whatever increments of 1/120th of an inch are necessary to expand or condense a line to fit between left and right margins. It does a beautiful job. Essentially the whole right-justification process is accomplished in one statement:

```
IF A$=".RJ ON" THEN LPRINT
CHR$(27)+"B$"
```

(Character 27 is the escape code that tells the printer that a command follows; B$ is the code to right-justify.) Proportional printing, where a W takes more space than an I, is just as easy. Thank you, NEC.

The underscore and bold commands took a little thought. I wanted to insert a special symbol around the text to be underscored or bolded. My *print* command would then strip those symbols off and insert the proper NEC control characters. The graphics symbols listed in Appendix G of the Basic manual are ideal for that use. I liked character 192 (└) to begin underlining and character 217 (┘) to stop underlining. To signify bold, I couldn't decide whether I liked 177 or 178 better. Maybe 221. And wouldn't symbol 127 (⌂) be great to indicate a superscript? I was excited about all those neat symbols IBM had given me to play with.

The way to enter graphics symbols from the keyboard is by holding the alternate key and typing the ASCII number on the numeric key pad. Well, that's a hassle. Maybe the function keys had a use after all. I could store character 192 in F1 and, whenever I



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wanted to begin underscoring, type F1. It would be easier to remember than alt-(numeric-pad)-192.

To stuff character 192 into the F1 key, I used *key 1, chr$(192).* I did a *key list* command and everything looked fine, but when I hit the F1 key a "@" printed. What happened?

What happens is that ASCII character 192 gets stored in memory correctly (*key list* proves that), but pressing the F1 key causes 128 to be subtracted before the symbol is printed. The ASCII value for "@" is 64 (64+128=192).

I spent hours calling pc clubs across the country looking for a fix to this bug. No one was of any help. Microsoft wouldn't talk to me. "Call IBM," they suggested. (Sure. And then maybe I'll give President Reagan a buzz.) However, a magazine editor did find out from a friend at Microsoft that (1) Microsoft didn't know about the bug and (2) they thought it was in ROM and not easily fixed. My compromise is to use an underscore for underlining and a backslash (\) for bolding and remember never, never to use those characters for anything else. So much for all the neat symbols.

The *print* command was running fairly well and I could think of lots of things to add to it when I ran out of memory. I din't run completely out, but I was getting so close that more than three pages of single-spaced text caused the infamous housekeeping routines to take over. The *print* command had almost as many statements as the rest of the program. That's how I discovered Basic's *chain* statement.

It wasn't love at first execution. The *chain* statement is supposed to act like an external subroutine, allowing you to call a Basic program from inside your main program and to pass variables to the chained-to program. The variables have to be named in a *common* statement in both programs. I did that, so how come I couldn't get variables passed back and forth?

A word processing program is, by its very nature, an integer affair. You don't have line 10 1/3 or look for characters beginning in position 20.5. I have a *defint a-z* statement in the top part of my program—that makes all variables except character variables (which must end with a dollar sign, anyway) integer. For some reason, to transfer variables to a chained program they must be typed by the last character in their name. (Ah, those crafty folks at Microsoft.) Num must be Num%; I must be I%. Do you know how many times I had used the variable I in my word processor? But this is just what my *change* command was for. I saved a copy of my program with the ASCII option and ran it on itself—changing all Is to I%s. That fixed the chain problem.

Chaining the *print* command *did* free up a lot of space in the editor part of the program, but getting to the chain is slow. There's a five- to twenty-second delay (housekeeping again!) before the disk drive comes on to load the *print* command. That's not as bad as it sounds. The printer is across the room, and while Basic is dusting and mopping, I go over and turn the printer on, adjust the paper, and look for a darker ribbon.

Even with the *print* command as a separate program, the text editor has only 16,000 bytes left for text. That's about five or six single-spaced pages—adequate for most of my writing. Larger documents I break into separate files and print with a Printer program. The Printer program is identical to the chained *print* command, except it takes its input directly from disk and can concatenate files. The only limit to the length of document I can print is the number of files on the disk.

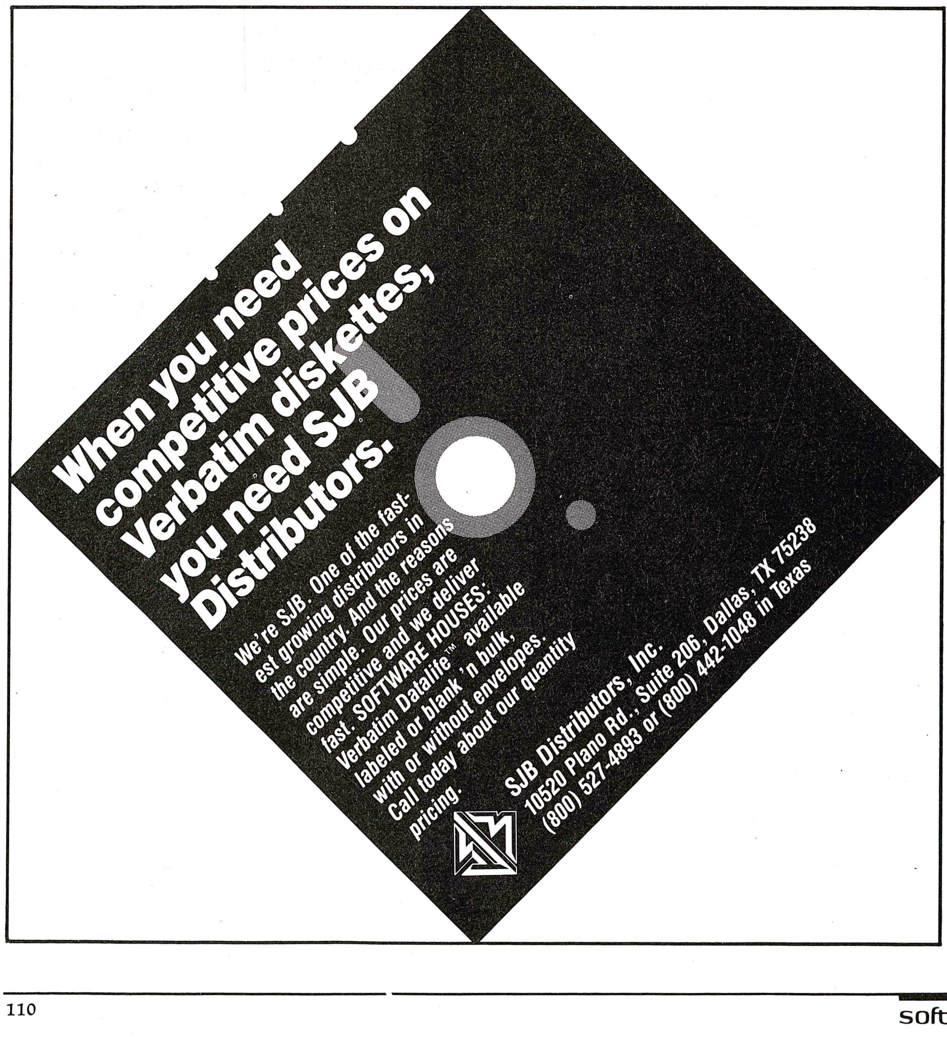
There *is* a disadvantage to having two programs to perform the printing tasks. When I make a change in one, I've got to make the same change in the other. The programs are just different enough to make that a chore. I can appreciate why software houses hate to maintain multiple versions of the same program.

Except for the *renum* command and chaining to the print command, the program operates as fast as the commercial products. And it won't crash or lose data. If there is an error, it restarts itself and waits for the next command. Someday I'll buy the Basic compiler and see if, as I've been told, it will eliminate the housekeeping waits. With another 64K of memory, I might be able to scrap the separate Printer program. Imagine what a hard disk would do?

All through this article you've probably been thinking that my program was the one that got the bad review. You are wrong. I am not eager to inflict yet another word processing program on the world. There are already too many. But I do recommend that you write your own. It's not as difficult as you may think. You learn a lot, and any bugs in the program are there because you are too lazy to fix them. Best of all, you can add customized features and commands to do exactly what you want. Last month I added subscripts, a digital clock, and a calendar feature.

For now, I'm completely satisfied . . . until I read another review that says I shouldn't have written a word processing program in Basic. ▲

Mr. Trivette is a microcomputer consultant based in Wrightsville Beach, North Carolina.



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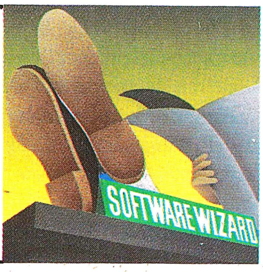


Δ After eight months of posing as bartenders and deli employees, San Jose police officers arrested forty-five suspects in a sting operation that recovered more than $1.5 million in stolen goods and drugs. To help keep track of all the suspects who were selling stolen goods for cash, the **San Jose Police** used a microcomputer with *PFS:File* and *PFS:Report*, according to **Software Publishing** (San Jose, CA). "We would never have been able to manage and coordinate all the paperwork without the computer and software," says SJPD Lieutenant Harry Stangle.

Some of the stolen goodies in the San Jose sting.

Δ Linda Marcus has been appointed manager of corporate communications at **State of the Art** (Costa Mesa, CA). Marcus previously served as sales promotion manager for the book division of Petersen Publishing.

Δ Former head of marketing **Martin Mazner** has left **Context Management Systems** (Torrance, CA) to start his own software publishing company. He will concentrate on programs for home and educational use.

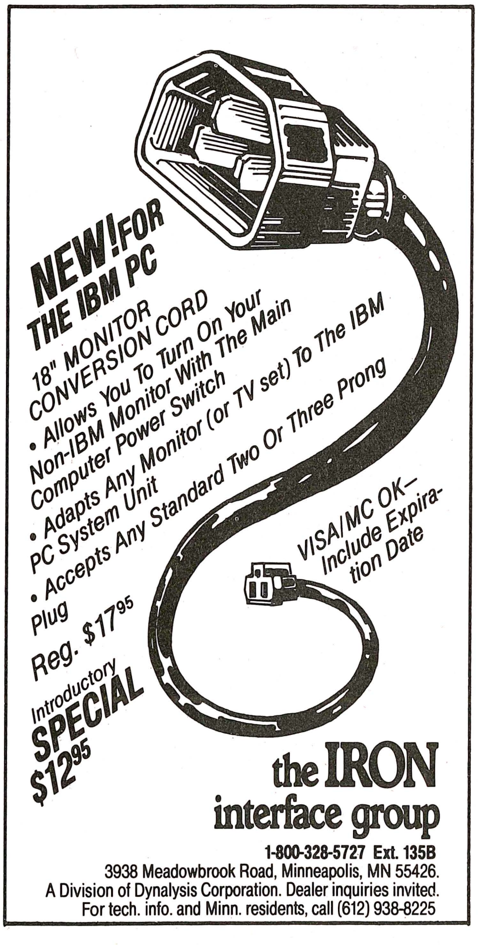
Δ **Software Arts** (Wellesley, MA) has appointed **Cathy E. Brown** as sales administration manager. Brown is responsible for overall planning, development, and control of administrative support for the company's sales department. She reports to Bruce H. Rampe, director of marketing and sales. Previously, Brown was supervisor of sales administration for the Gillette Company, PaperMate Division. Δ Other newcomers to Software Arts: **Michael P. Silverman** has been named to the position of New England sales representative. He comes to the company from the Computer Store, where he was corporate accounts manager. **Duncan Lear Newherter** has been appointed technical support manager. In this newly created post, Newherter will hire, train, and supervise the staff of technical support specialists for the company; he reports to Diane Curtis, product manager. The technical support staff fields questions from users as well as distributors and dealers. Newherter comes from CPU Computer, where he was director of marketing and technical support.

Δ **Richard J. Tata** has been appointed vice president of operations at **Corona Data Systems** (Westlake Village, CA), reporting directly to company president Daniel R. Carter. Tata is responsible for directing production of the company's hard disk subsystems line. Previously Tata served as vice president of operations at Vector Graphic, general manager at Burroughs, and director of manufacturing at Dataproducts. "Dick's twenty-seven years of related operations experience in the computer industry, plus his drive and desire, are necessary to help us meet the challenges our company faces," says Carter.

Δ **Atasi** (San Jose, CA) has announced the staffing of three new key finance positions. Joining the company are **Gregory E. Myers** as director of measurements and controls; **Sigmund F. Prager** as director of accounting; and **John R. Westrum** as manager of credit and collections. All three report to Howard Bain, vice president of finance. Δ The company has also received additional financing, boosting its total equity investment to $7 million. All existing investors participated in the financing, including lead investor Donaldson, Lufkin & Jenrette (Sprout Group); US Venture Partners; First Chicago Capitol; Memorial Drive Trust; and Oscco Ventures.

Δ In less than a year, the fledgling **Compaq Computer** (Houston, TX) has raised more than $40 million in equity and debt financing. The company has just finished a third round of private equity financing totaling $20 million; it had previously raised $10 million in venture capital. In addition, a $10 million revolving line of credit has been secured from InterFirst Bank Houston. The $10 million was the largest underwriting for a high-tech start-up company in its first year, reflecting the bank's confidence in the company's product and financial position. Δ On the court battlefront, the company has filed an answer and counterclaim in the Federal District Court of Houston concerning the litigation previously brought against it by **Texas Instruments**, which claims that Compaq raided TI of manpower and ideas.

Δ In a move to keep up with the growth of the market, four new marketing representatives have been appointed to the sales staff at **Continental Software** (Los Angeles, CA). The four new reps are **Paula Deslatte**, **Sally Hammer**, **Mike Hilton**, and **Penny Olender**. **Denny Mosier** has been named marketing manager of the company, heading up a marketing unit responsible for research, advertising, public relations, planning future software programs, and supporting existing products. Mosier was previously an account exec with Simon/Public Relations. Be-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fore joining Simon, he was a correspondent for *Electronic News*, a computer and electronics trade publication.

Δ **Sritek** (Cleveland, OH) has reached an agreement with **Carnegie-Mellon University** (Pittsburgh, PA) to supply several hundred 68000 coprocessor boards with the Xenix operating system. The modules transform the IBM XT into a thirty-two-bit computer. Carnegie intends to employ more than one hundred of the XTs across their campus by fall to help students and faculty members get experience in working with personal workstations. Several of the XTs will be networked, sharing a large file server. Last October, IBM and Carnegie-Mellon signed an agreement to cooperate in the development of a comprehensive computing environment to be installed by 1986. The Sritek software and hardware is intended to serve interim computing needs and developmental purposes.

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Δ **Audrey H. Dykstra** has joined **MicroRIM** (Bellevue, WA) as technical support manager. Dykstra has an extensive computer background. She has served as senior field analyst for Computer Automation, has organized a new computer facility for Tetra Tech, and was senior systems analyst in the telecommunications department of the San Francisco-based Bank of America. Δ The company has also announced it will establish retail distribution channels to expand distribution of its software. The firm had previously been selling through OEMs. A comprehensive dealer training and merchandising program is under way.

Δ At **Digital Research** (Pacific Grove, CA), **John Rowley** has been promoted from chief operating officer to president. Rowley succeeds founder Gary Kildall, who remains chairman of the board and chief executive officer. Says Kildall: "Over the past eighteen months, John has targeted new high-growth markets and has organized the company to serve them profitably. These facts, combined with John's understanding of the industry, have convinced me that we will continue to benefit from his leadership." Δ Several high-level appointments designed to expand the company's international scope: **Stephen Maysonave** has been promoted from director of field operations to vice president of sales and world trade. **Bruce Cohen**, formerly the eastern regional manager, has been made director of eastern operations. **Steve Klann** has joined the company in the newly created position of director of western operations. Δ Far East operations have been announced, headquartered in Tokyo. Joining the firm to manage this branch is **Masahiro Morimoto**, director of Pacific operations. Morimoto has held international sales positions with Durango, Xerox, and Diablo Systems. He will report to Maysonave. European operations have been expanded with the opening of a company facility in Germany. Head of the facility is **Dieter Kadach**, most recently Zilog's director of central European operations. He will manage a staff of six.

Δ **Tecmar** (Cleveland, OH) has announced

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that it has been selected by Sears Business Centers as a vendor for multifunction pc boards. Δ The company also plans to move to a one-hundred-four-thousand-square-foot facility by midyear.

Δ **Nancy Moren** has been appointed western regional sales manager at **Tecstor** (Huntington Beach, CA). Moren joins the company from General Electric, where she worked in both marketing and sales. She will helm the Dallas, San Francisco, and Los Angeles offices.

Δ **Mark Vidovich** has been named president of **Software Distributors** (Culver City, CA). Prior to joining the company, Vidovich was regional manager of more than thirty-one stores for Pacific Stereo of southern California. In 1982 he received one of ten Retailer of the Decade awards.

Δ In a first-of-its-kind arrangement, book publishers **Simon & Schuster** (New York, NY) has signed to distribute the software of **Bruce & James Program Publishers** (San Francisco, CA). The first package to hit the shelves will be *Wordvision*, a word processor exclusively for the pc. According to president of the book company, **Alvin B. Reuben**, Simon & Schuster will rely on its traditional sales organization to reach booksellers, while establishing a network of reps specially qualified to cover computer, electronics retail, and mass merchandise accounts. Bruce & James president **Jim Edlin** considers bookstores "a natural, but as-yet untapped, retail base." The company's Vision line of software will be packaged to be browsable and aimed at the computer person who is also a bookstore customer.

Δ A company that has previously been known for its fruit-labeled line of surge protectors (Lime, Orange, and Peach) has announced it is going into the software business. **Electronic Protection Devices** (Waltham, MA) has formed a subsidiary called EDP Software. One of their first packages will be a line of games called *The Executive Lunch Box*, with two games on each disk for the amusement and relaxation of today's computer-intense office worker.

Δ *Volkswriter* word processor is now available for two more micros, the Dot personal computer from Computer Devices and the Multipersonal Computer from Columbia Data Products. **Lifetree Software** (Monterey, CA) has signed original equipment manufacturers agreements with the two companies. ▲

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that it has been selected by Sears Business Centers as a vendor for multifunction pc boards. Δ The company also plans to move to a one-hundred-four-thousand-square-foot facility by midyear.

Δ **Nancy Moren** has been appointed western regional sales manager at **Tecstor** (Huntington Beach, CA). Moren joins the company from General Electric, where she worked in both marketing and sales. She will helm the Dallas, San Francisco, and Los Angeles offices.

Δ **Mark Vidovich** has been named president of **Software Distributors** (Culver City, CA). Prior to joining the company, Vidovich was regional manager of more than thirty-one stores for Pacific Stereo of southern California. In 1982 he received one of ten Retailer of the Decade awards.

Δ A comprehensive consumer-based study of the software market is being conducted by **Microcomputer Research Group** (Mountain View, CA). Scheduled to be completed by year's end, the study is intended to define, explain, and provide structure to the highly fragmented industry. Key elements will be a statistical summary of primary research and its interpretation, profiles of industry players, and a full day of private briefing.

Δ A new cable television programming service called **The Games Network** (Los Angeles, CA) will offer cable subscribers across the country twenty video games per month, twenty-four hours a day. Over a thousand games have been acquired for the Network's library, including the best of **Broderbund**, **Micro Lab**, **Edu-Ware**, **Adventure International**, **Hayden**, **Sentient**, and **Avant-Garde**. An initial fee buys a special game keypad. Players can compete against the Network, or, eventually, other subscribers. Weekly cash awards for high scores will be given.

Δ **IBM** (Boca Raton, FL) is rumored to be working on a portable computer called the Crackerjack, according to *Fortune* magazine. The Crackerjack will go up against the MacIntosh from **Apple Computer** (Cupertino, CA), a forty-percent-less memory version of the Lisa, with most of the same features. Apple has agreed to sell 3,000 of the lightweight portables, priced between one and two thousand dollars, to Philadelphia's Drexel University. The Crackerjack may be on the market by year's end.

Δ In a first-of-its-kind arrangement, book publishers **Simon & Schuster** (New York, NY) has signed to distribute the software of **Bruce & James Program Publishers** (San Francisco, CA). The first package to hit the shelves will be *Wordvision*, a word processor exclusively for the pc. According to president of the book company, **Alvin B. Reuben**, Simon & Schuster will rely on its traditional sales organization to reach booksellers, while establishing a network of reps specially qualified to cover computer, electronics retail, and mass merchandise accounts. Bruce & James president **Jim Edlin** considers bookstores "a natural, but as-yet untapped, retail base." The company's Vision line of software will be packaged to be browsable and aimed at the computer person who is also a bookstore customer.

Δ A company that has previously been known for its fruit-labeled line of surge protectors (Lime, Orange, and Peach) has announced it is going into the software business. **Electronic Protection Devices** (Waltham, MA) has formed a subsidiary called EDP Software. One of their first packages will be a line of games called *The Executive Lunch Box*, with two games on each disk for the amusement and relaxation of today's computer-intense office worker.

Δ *Volkswriter* word processor is now available for two more micros, the Dot personal computer from Computer Devices and the Multipersonal Computer from Columbia Data Products. **Lifetree Software** (Monterey, CA) has signed original equipment manufacturers agreements with the two companies. ▲

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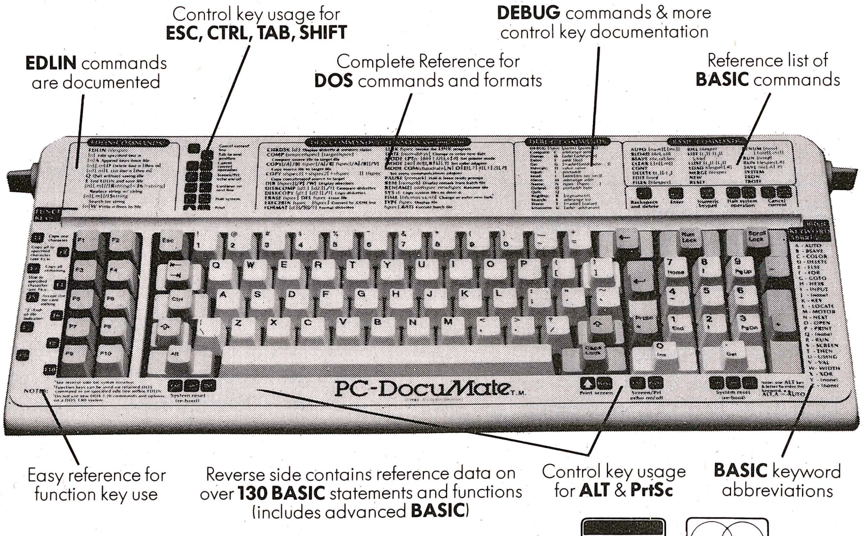

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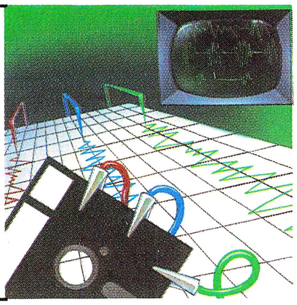

Unless otherwise indicated, software listed runs in DOS 1.1 or 2.0 with either display adapter and requires 64K and at least one disk drive.

Diet Analyzer and **Nutritionist.** If you just bought Dr. Tewton Fati's *Wichita Falls Sure-Fire Diet* book that everyone's talking about, or you believe you can lose ten pounds in ten days eating chocolate cake and sauerkraut, or (seriously) your doctor says low sodium or die, then these programs are for you. And if you believe you are what you eat, these programs will tell you exactly what that is. While the intent of the two programs is similar—to analyze your daily consumption of vitamins, minerals, protein, calories, carbohydrates, and so forth—the procedure, scope, and even the databases of the two differ markedly.

Diet Analyzer is the less ambitious. It provides a database of five hundred foods and one menu (program, not dinner). You can add, delete, change, or display a food and its analysis by keying in its number. To find out what that number is, however, you must first select "Print listing of foods" from the menu. Even given the relatively (and the word, given software costs, is used loosely) low price of this program, one might expect SimSoft to supply at least a Xerox copy of the food listing, since the output comes to sixteen sheet-fed pages (and your printer needs 132 columns or condensed-print capability).

Once you've got the list, you'll see some three hundred unused numbers; these are for adding your own foods to the database, should you want to translate, by weight and serving, the ingredients in your famous bouillabaisse.

A difficulty with nutritional analysis, electronic or otherwise, is that our diets are filled with practically indecipherable combinations, ranging from pizza and chow mein to pâté de maison and mystery casserole. Few of us, following dinner at our favorite French restaurant, can easily identify *what* we've eaten, much less know its weight in ounces.

If, however, for breakfast (as an example) you ate two eggs scrambled, two slices of crisp bacon, two slices buttered wheat toast with one tablespoon of jam, and an eight-ounce glass of milk, either program could tell you exactly how many grams, milligrams, or whatever of protein, fat, calories, and various vitamins and minerals you consumed.

Diet Analyzer does that by asking you to input the number and portion size of the various foods, after first determining that your printer is on-line. There is no screen output. As each number is received, the program spits out on your printer two rows of numbers under abbreviated headings for nine minerals, eleven vitamins, plus calories, protein, fats, and carbohydrates. The columns are totaled after input is completed.

That's it. You have an impressive list of numbers, but unless you're fairly knowledgeable about nutrition, you probably don't know what they mean. Most people would recognize that, say, twelve thousand calories means you ate more pecan pie than the average family needs, but what does 3,205 units of potassium indicate? Are you deficient? Are you overdosing? Obviously, the program would be considerably more useful if it did something with its information—such as suggesting you eat a banana, but it doesn't.

The *Nutritionist*, while still falling short, at least attempts an eat-a-banana option and is generally more sophisticated. First, it comes in a very nice binder with the pages already in the rings and includes a copy of the U.S. Department of Agriculture's booklet, *Nutritive Value of Foods*. This is the program's database, 730 items ranging from "Cheese, natural, blue" to "Yeast, Brewer's, dry."

Interestingly, the databases of the two programs differ considerably, although both programs let you modify them (you may add and delete foods and adjust portion specifications). The *Diet Analyzer* not only includes tea and coffee (the *Nutritionist* does not), it lists daiquiri, anisette cordial, and 86-proof rum. The *Nutritionist* includes four kinds of fresh fish; *Diet Analyzer* lists sixteen, including three varieties of perch. Somewhat disturbing, however, is the disparity in nutritive contents of the same food. One cup of peanuts, roasted, in one program has 840 calories; in the other it has a whopping 1,397. The calorie-conscious will spurn either, of course, but questions arise. Whatever your opinion of the U.S. Department of Agriculture, you probably trust them to know the caloric content of a cup of peanuts. Although SimSoft's database appears thoroughly professional and lists several vitamins and minerals that the *Nutritionist* doesn't, the origin of the database, at least in the documentation, is anonymous. This may be disconcerting to those who, if they can't have a governmental stamp of approval, would like one from the University of Chicago or, failing that, from the ever-popular "qualified experts."

Peanuts aside, the *Nutritionist*, which is menu-rich, permits you to select one of the twenty-one RDA (Recommended Daily Allowance) "types" that best describes you or the person whose diet you're analyzing. Nutritive analysis, which is figured against the Department of Agriculture's RDA specifications, is different, obviously, for an infant, an adolescent, a lactating female, or a middle-aged male. In fact, the same three meals that will exceed a woman's caloric requirements may fail to meet those of a man. The couple who share the same meals in the same portions may soon look like Jack Sprat and his wife.

The program's extensive menus permit you to create, save, or delete a diet; analyze a diet or a single food; sort a diet by nutrients; or run the *screen filter* (more on that later). Having chosen to "create" a diet, you input the appropriate food numbers and portions from the USDA booklet. The menu option that analyzes the diet uses a bar graph to show your intake and RDA percentage of calories, protein, calcium, phosphorus, iron, vitamins A and C, thiamine, riboflavin, and niacin. The screen shows, too, the total grams consumed in eight other nutrient categories, including cholesterol, carbohydrate, sodium, and saturated fat.

An analysis of three probable meals for an average American woman produced a graph showing deficiencies in iron and calcium and a reading of 2,797.5 milligrams of sodium, which is on the high side of the range recommended by the National Research Council (the USDA makes no recommendation on sodium). To find the source of the sodium (and, presumably, to thereby reduce your future intake), you select the sort-by-nutrient option. In the sample diet, the high-sodium culprit turned out to be a piece of apple pie.

One of the *Nutritionist*'s most useful features permits a "what if" approach to dietary analysis. If you are planning a day's meals, you can, while watching the bar graph make adjustments, add and delete food numbers indefinitely, and try to arrive at the perfect day's consumption. In the sample diet, a substitution of one cup of oatmeal for eggs and bacon increased both calcium and iron intake and decreased calories by six percent.

Although the *screen filter* option appears, from the somewhat murky documentation, as if it should suggest dietary adjustments based on the bar-graph analysis, playing "what if" probably will be more successful. You can't just call up the screen filter, input your specifications, and have the program tell you to pitch the pecan pie and eat carrot sticks. Unless you are uncommonly knowledgeable, most foods won't meet your arbitrary specifications of decreased or increased values for the nutrient categories, which is how the screen filter sorts. Although the option is still fairly unsatisfactory, it appears to work more successfully when lower numbers are input. Based on the deficiencies in the fictitious diet, a screen filter sort specifying a three-milligram increase in iron, five in calcium, and a five-milligram sodium decrease produced an eight-item list that included dates, nuts, pumpkin kernels, lima beans, and semisweet chocolate—hardly a successful dinner substitute for pork chops and potatoes. Since it takes about twelve minutes to run the screen filter against the entire database, one would soon tire of experimenting.

The other disappointment with this generally laudable program is its lack of information on error messages and the configuring of various printers. There is no printer-setup documentation at all, only a screen menu inviting you to select option 1, 2, or 3, each of which produced error messages with the Brother HR-1. Fortunately, almost all of the information you might wish to print is complete in one screen and the pc's print-screen key does the job nicely.

Obviously, for those who must control sodium or cholesterol intake, these are very valuable programs, all deficiencies aside. Indeed, the temptation might be to combine the databases of the two programs, since they are not especially redundant. Even for the merely curious, these programs are useful. Who would have predicted all that sodium in a piece of apple pie? JI

Diet Analyzer, by SimSoft, Inc. (1258 Seventeenth Street, Marysville, MI 48040; 313-364-7241). $50.

Nutritionist, by Laurie North, N-Squared Computing (5318 Forest Ridge Road, Silverton, OR 97381; 503-873-5906). $145.

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Cyborg is the first text adventure to feature a true plot. Its puzzles add up logically to the equivalent of a short science-fiction story. And just like a story, you don't know much on the way in until you've read a few pages. It may take you a few false starts to get the hang of *Cyborg*, but once you do, you'll be hooked, and a whole new world of electronic speculation will open up to you.

You start the game at a disadvantage. The machine half of you is lost, naked, disoriented, and low on power. The documentation is brief, mainly explaining the way you enter Sentient's full-sentence commands and giving you a brief outline of how you became half-human, half-machine. Best thing to do is start mapping and get on with it. That's why they call them adventures.

You first find yourself in what seems to be an artificial forest filled with passageways, rooms, and mirror images of other places. Mundane and superscience-type objects are scattered about. Information is at a premium; it must be earned. Frustrations abound. Who, what, where, and why are the leading questions.

The first creature you meet in this alien world is a hungry lizard. What lizards eat on this world is anyone's guess and one of the first puzzles you encounter. Getting yourself dressed, armed, and permanently powered are others. Meanwhile your bio clock is ticking down. Rituals and procedures are hinted at by signs and the opinions of your machine half. All you know is you are "out of it" in a complex universe you are only beginning to understand.

As you persevere in your quest, the plot unfolds, leading to a remarkable and totally logical conclusion. *Cyborg* contains all the best features of the adventure genre: Your wits are challenged, your mental and logical skills are rewarded, and your sense of accomplishment is expanded. That's three notches on anyone's game belt.

Having a cyborg that scans and gives opinions on your situation as a traveling partner is a brilliant game device that replaces the programmer's comments in other adventures. As a literary device, it only enhances the interactiveness of the adventure. This integrated character approach is what makes Berlyn's adventures stand apart. In the future, all speculative fiction writers should be game programmers too.

This approach changes the standard adventure command structure. Instead of asking for a *catalog* of your possessions, you ask for a *body scan*. *Get* will pick up something, but *use* is of no use. *Go door* will yield a garbled message response; *enter cabinet* will allow you to do so. Syntax is honored in this game. It has its own logic and may seem random, but it's an adventure that all adds up in the end. MF

Cyborg, by Michael Berlyn, Sentient Software (Box 4929, Aspen, CO 81612; 303-925-9293). $34.95.

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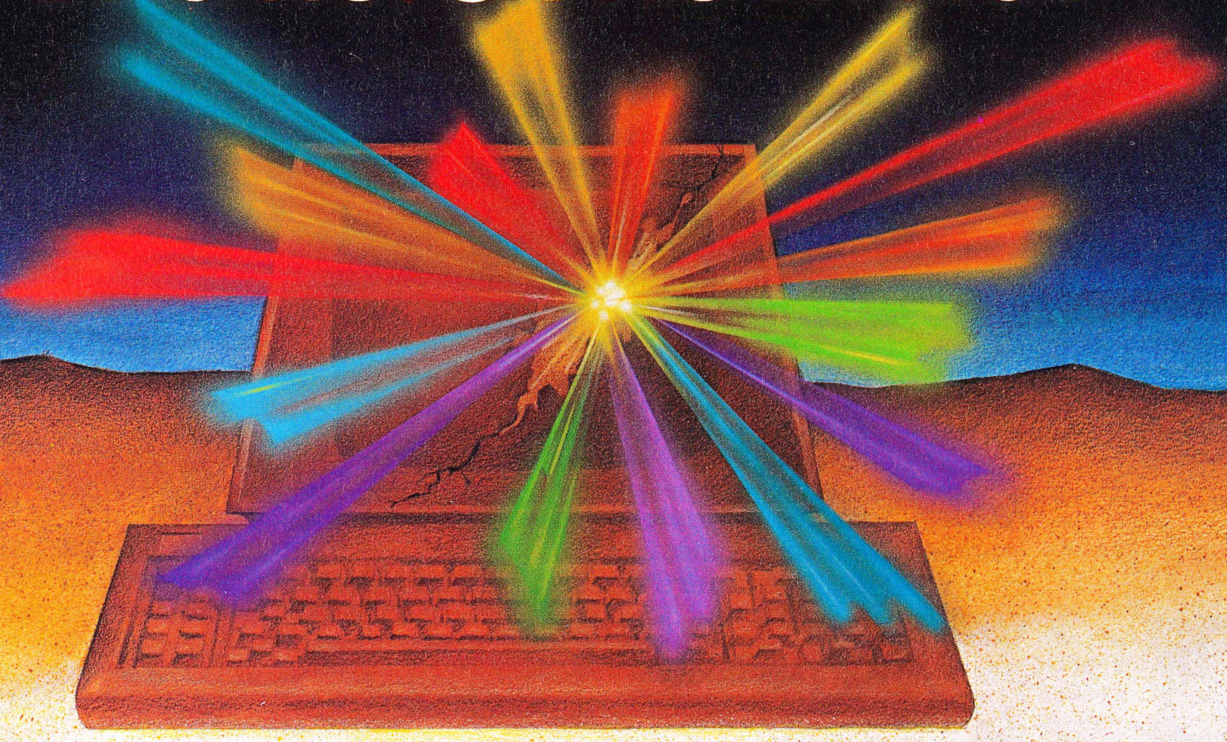

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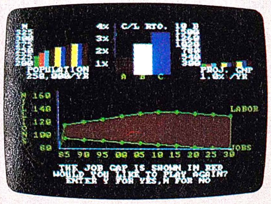

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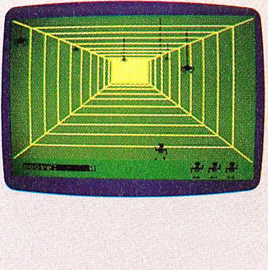

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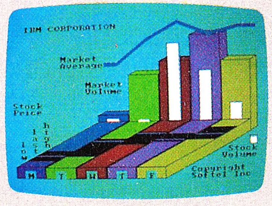

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Spanish for the Traveler. By Dr. Janice Davidson and Richard Eckert. If the extent of your Spanish lies in a direct line from *sí* to *olé*, with not much more than *taco* in between, this easy-to-use little program will help you ask the *botones* to carry your *maleta*. The design is based on the tried-and-true flash-card technique, with words, expressions, and sentences appearing in various categories of interest to the tourist: souvenirs, touring, sightseeing, dining out, and so forth. To aid correct pronunciation, the package includes a set of cassette tapes for use in conjunction with the program. A thorough documentation booklet also contains the vocabulary in both English and Spanish.

Each unit of study, starting with "Your Arrival," covers such vocabulary categories as places, things, and people. Words and phrases appear on the screen, timed to match the accompanying cassettes (you may increase or decrease the speed of screen presentation, but not, of course, the cassettes). Upon completion of the vocabulary presentation for a particular category, you can choose to be quizzed from English to Spanish or vice versa. The proper response is rewarded with lavish praise. Scoring includes both number and percentage of correct answers, and elapsed seconds are recorded for those who like to test their response time.

Quizzes are strictly multiple-choice. A weakness of the program is that you are consequently more likely to *recognize* these words and phrases than you are to recall them. There is no allowance in the program for your keyboard input other than choosing the number or letter of the correct answer. Also, words and expressions are presented invariably; you will soon learn the order of the words, and that also will aid correct choices.

Still, you are bound to pick up a few words and phrases, and our south-of-the-border friends will appreciate your attempts to use their beautiful language, however lamely. This program won't enable you to engage in philosophical discussions with learned professors, but at least you can ask the bellboy to carry your suitcase. JI

Spanish for the Traveler, by Dr. Janice Davidson and Richard Eckert, Southwestern Data Systems (10761 Woodside Avenue, Suite E, Santee, CA 92071; 619-562-3670). $59.95.

KB 5150. The KeyTronic KB 5150 keyboard for the IBM Personal Computer is lighter, more responsive, and quieter than the one that came with your machine. At the same time, it still affords some degree of tactile feedback as you type. The keyboard seems slightly lower cut—the terracing not as steep between rows and the keys more deeply dished—which conserves a typist's energy on long jobs. Keys are easier to read, and small bumps are provided on the F and J keys to guide touch typists; there's a similar bump on the 5 key in the number pad to help you keep your place while you punch in figures. The long plus and minus keys to the right of the number pad have been swapped for a small plus/minus key and an additional enter key.

One of the most frequent sources of annoyance with the IBM keyboard is its failure to inform you of the status of the various toggles—the num lock, scroll lock, insert, and caps lock keys. KeyTronic's board provides LEDs to tell you at a glance whether these keys are on or off, and for this embellishment alone KeyTronics deserves applause.

Another common grievance with the IBM keyboard is the awkward placement of certain keys; with this problem in mind, KeyTronics has relocated the enter key, the accent key (the one with the tilde and the grave), the left shift key, and the backslash. Enter is now on the home row (and has been renamed Retrn, to distinguish it from the enter key to the right of the number pad); the accents are a row higher; and the left shift and backslash have exchanged places. This seems a far more satisfactory arrangement for ordinary typing needs, since the backslash is used almost exclusively for programming.

KeyTronics has also changed the marking on some keys that had caused complaint: back space is now labeled *Back Space*, tab is called *Tab*, and shift (believe it or not) is marked *Shift*.

If you've grown accustomed to the standard-issue keyboard, you'll notice two things when you switch. First, the KB 5150 is hypersensitive, compared to the board you're used to; initially you'll type a lot of extra characters. Second, you'll hit the backslash key when you mean to hit the left shift. Such problems will disappear quickly, and you'll soon wonder how you got along with that old clacker. rw

The KB 5150 Keyboard. KeyTronic (Box 14687, Spokane, WA 99214; 509-928-8000). $199.

States 'n' Caps. Quick! What's the capital of Vermont? If fourth-grade drill on state capitals failed to leave its mark—or if you're in the fourth grade—here's a program designed to test your recall and recognition of the fifty states and their capitals. A map of the United States serves as the cue, with a marker flagging one state at a time. You're asked to identify the state or its capital or both, depending on your menu selection. Those who can hardly remember even being in the fourth grade might find this more of a challenge than supposed. At the conclusion of the quiz, you're scored by the number of attempts, number correct, percent grade, and elapsed time. Fortunately, the program gives second chances—although this obviously increases the number of attempts and decreases your percent grade—and, since the correct answer is provided, you'll eventually get all fifty combinations.

You must correctly type in the state and capital, and no allowance is made for close spellings. Either you know how to spell Tallahassee or you don't. No quarter is given on punctuation, either. The program wants *St. Paul* complete with period *and* space. Unfortunately, such exactness, though required of the user, is not equally tendered. Alphanetics could use a proofreader, electronic or otherwise. Invariably, the word *capital* is misspelled as *capitol* and the distinction is not so fine as to defy average attention to details, especially in a distributor of educational material. Further, one state and one capital are misspelled by the program. If you or your

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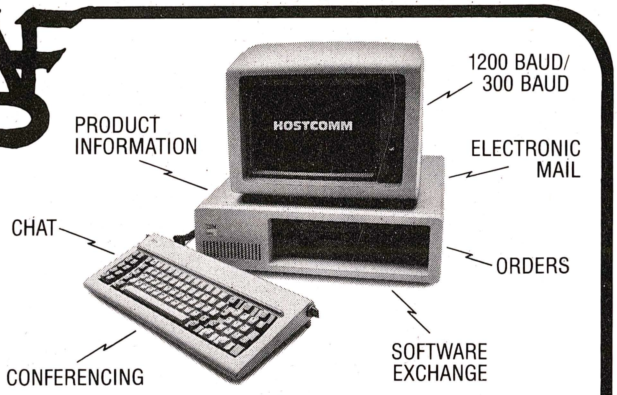

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fourth-grader are easily intimidated by "Wrong!" messages, you may be tempted to believe there actually are two e's in Massachusetts and in Santa Fe. Don't. However, you'll have to accept the errors to complete the quiz. Jl

States 'n' Caps, by Alphanetics Software (Box 339, Forestville, CA 95436; 707-887-7237). Requires color/graphics adapter. $29.95.

Quotrix. By Jeremy Wilson. You could play this word game for one or two players with a dictionary of quotations in one hand and your keyboard in the other, but that would be cheating. However, it wouldn't hurt to have an almanac, a French dictionary, a Spanish dictionary, the *Rolling Stone Book of Rock Lists,* and several other reference books by your side when you play. Part of the game requires answers you may not have.

The object of the game is to complete a quote, listed at the bottom of the screen each round as a sentence made of question marks, with only the quote's author as a guide. Your challenge is to fill in the letters of the words, word by word, until you complete or guess the quote.

Various function keys get you in and out of the sections of play, back and forth from the main menu. You have a choice of six skill levels—beginner, trainee, capable, competent, expert, and master. Help menus at each stage of the game allow you to learn to play as you go rather than having to sit down and memorize twenty pages of documentation. A brief scan of the booklet and game rules will suffice.

There are three ways to complete a quote, once you have set your skill level and your quote has been displayed. *Quotrix* selects at random either the word jumble, a pick and solve, or a load-the-camel's-back format. The word jumble is a timed puzzle. In the time allotted, given your skill, you have to rearrange a set of letters in the correct order of the word you are solving. Pick and solve is where all those reference books come in handy. You are asked a question in an area of knowledge you have selected from a list. The word you are trying to locate is hidden in a vertical row among the horizontal rows of correct answers. By tapping the return key repeatedly, you can come to the correct answer if you are completely stumped. With this feature, you can also skip trying to find the answer at all. Loading the camel's back presents you with the outline of a camel made of letters. Guessing a wrong letter in the word you are working on will load the camel with a box. Seven boxes break the camel's back.

High score on this game is 10,000 points. If you fail to solve a given puzzle, the word is revealed and your score reduced. A personal best score display keeps track of the action of each player on each level. A minor annoyance is that this score page pops up at strange parts of the playing, such as when you're returning from a help menu.

While the camel puzzle and the pick and solve puzzle require mostly guesswork, the word jumble puzzle requires specific answers to specific questions, such as who won the Oscar for best actress in *Kitty Foyle* (Ginger Rogers), or what is the Mile High City (Denver). One would assume the questions would be more difficult as the levels progress, but the Mile High City question came up on both beginner and capable levels. It makes you wonder.

Your next question may be, how many quotes are there to solve? The documentation doesn't say, but a brochure says hundreds. So, even if you can figure out a few easy answers on the way to completing a word, the sheer amount of words to solve should keep any player happy puzzling it out with the quotemeisters on the way to the perfect 10,000. mf

Quotrix, by Jeremy Wilson, Insoft (10175 S.W. Barbur Boulevard, Suite 202B, Portland, OR 07219; 503-244-4181). $34.95.

PC-File. By Jim Button. This full-featured, twenty-five-dollar database program compares favorably with *VisiFile* and *EasyFile.* It has extensive filing, searching, sorting, displaying, and report-generation capabilities.

In 64K pcs, each database holds up to four thousand records—increased with additional RAM. Each record has a maximum of forty-one fields, with up to sixty-five characters per field, although records with more than twenty-two fields are limited to twenty-two characters per field.

Records are handled by indexed, random-access files, which store data in ASCII. Files can be transported for use in *VisiCalc*, *WordStar/MailMerge*, and other programs, or duplicated to create new databases.

The program, fully menu-driven, has clear and consistent prompts. You can type commands or use function keys to *add*, *mod*ify, *del*ete, *dis*play, or *find* a record; *list* or clone the database, see the record *lay*out, alter a field *name*, and *end* or change the database.

After you define a record with name and length of fields, data is entered by typing and then pressing return. Entering an apostrophe into a field duplicates the same field in the previous record, a timesaver for records with lengthy identical fields.

A set of symbols lets you move around within the database to read or modify data. Type *key* along with the information contained in the first field and you're shown the entire record. Records are automatically numbered sequentially when entered (you can use them to print a report); to modify the third record, you type 3. To recall the record last modified, type #. The plus key calls up the record following the record last modified, and the minus key brings up the record preceding the one last modified. The backslash displays the last record in the file.

The same symbols retrieve records for deletion, but there is no function key for this command; to prevent accidental erasure, you must type *delete.*

PC-File is written in compiled Microsoft Basic, which expedites

▸ ▴ ▸ ◂ ▴ ◂ ▾

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On Saturday, June 18, spreadsheet guru Jack Grushcow, author of the Profit Plot, will be at *Softalk*'s booth ready and willing to answer your questions about programs like *1,2,3* and *VisiCalc*. So stop by booth number 741 and start spreading those sheets.

If profitable plotting isn't your bag, you're still invited to stop by booth 741 all three days and meet the folks who produce the magazine you're holding. We'll try to answer any and all of your questions, and we'd really like to meet you and hear what you have to say.

See you there!

sort and search operations. Records can be sorted on ten control fields in ascending or descending order. You can sort fields by the first few characters.

The records themselves are not sorted; a smaller index file, residing entirely in main memory, with pointers to the data, "sorts" records quickly—one minute for 750 average records on a pc with 64K, nearly four thousand records in five minutes.

You can simply and quickly search records for partial or exact matches. You can find the record with the field "Smith, John," or all the records with last names beginning with "Smi."

You can list records in a variety of formats to screen, printer, or disk. On disk, you can list all selected records to create a new database, or select records on equal, unequal, greater-than, or less-than relationships. A bibliography database, for instance, with a date-of-publication field could create a report listing all books written before 1975, after 1962, or only in 1982. With an author's-name field, the report could include books by "Smiley, Horace" published prior to 1955.

As you select data fields for a report, the screen shows a running total of horizontal columns. *PC-File*'s default printer setting, an Epson dot-matrix printer in condensed print, permits a maximum of 132 columns per printed line. You can insert carriage returns to print fields in vertical format, or list empty fields of spaces to fill in from existing records.

Field names ending with # indicate numeric data; the program will total and right-justify the fields when creating reports.

The *PC-File* disk includes a text file of documentation, *pc-file.doc*, that when printed is a thorough, eighteen-page instruction manual, with a detailed table of contents.

When *PC-File* data is exported to *VisiCalc*, records are converted to DIF format; exporting to *WordStar* creates records with fields separated by commas, the accepted format for *MailMerge*. *PC-File* can also import files created with word processors or other programs.

PC-File requires 64K and one drive; two drives are preferable, and the program will support four and can be used with hard or RAM disks for increased speed.

Inspired by Andrew Fluegelman's Freeware concept, Button has placed *PC-File* in the public domain to be freely used, copied, and given to other pc owners. Those who find the program useful and remit the requested "contribution" of twenty-five dollars will receive future releases, updates, and enhancements. dc

PC-File, by Jim Button, User Supported Software (Box 5786, Bellevue, WA 98006). $25. ▲

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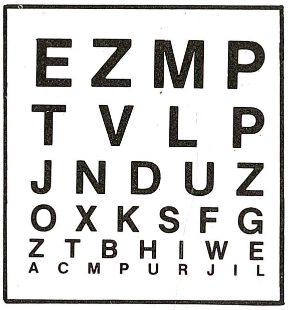
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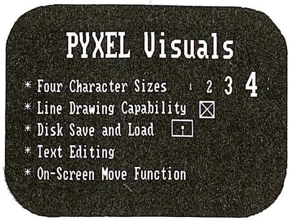
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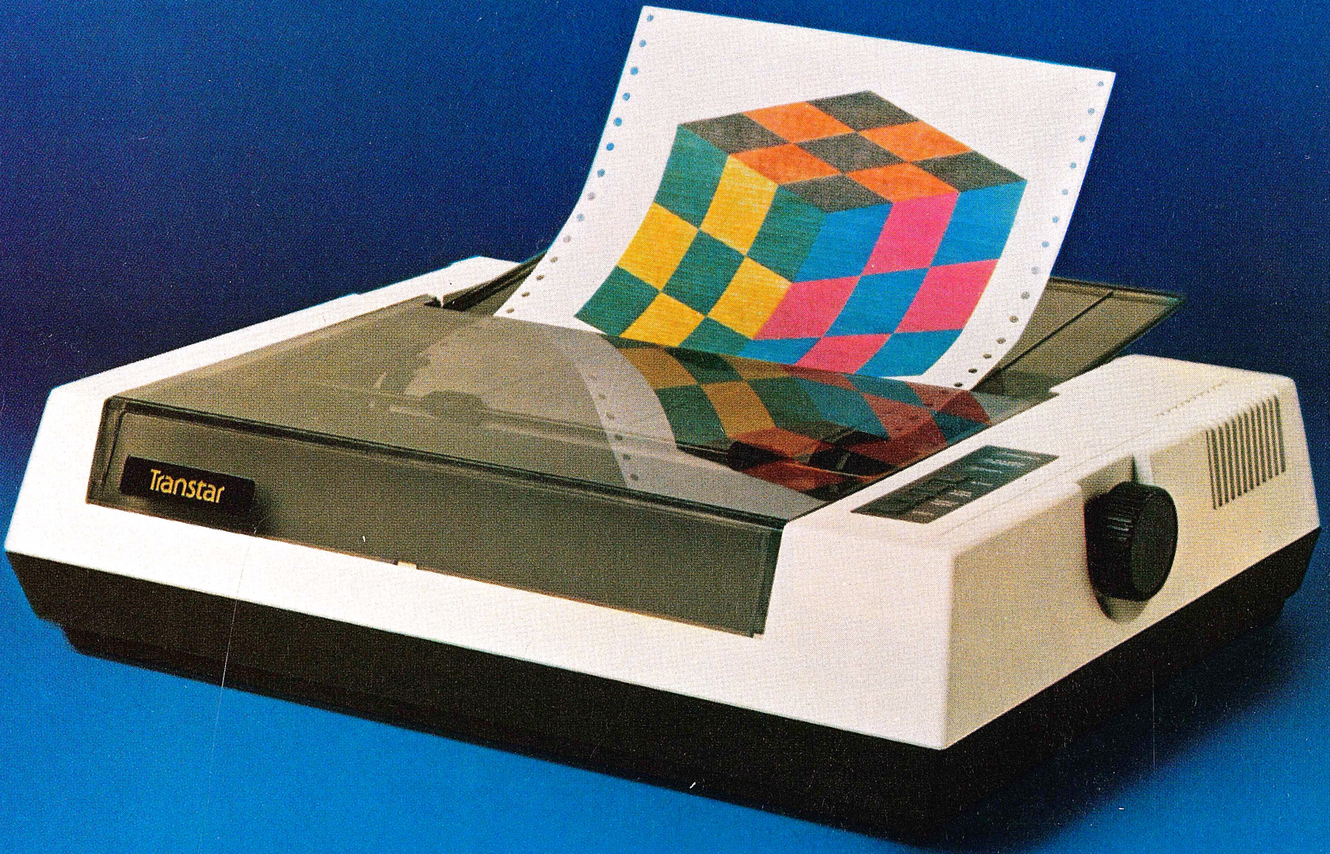

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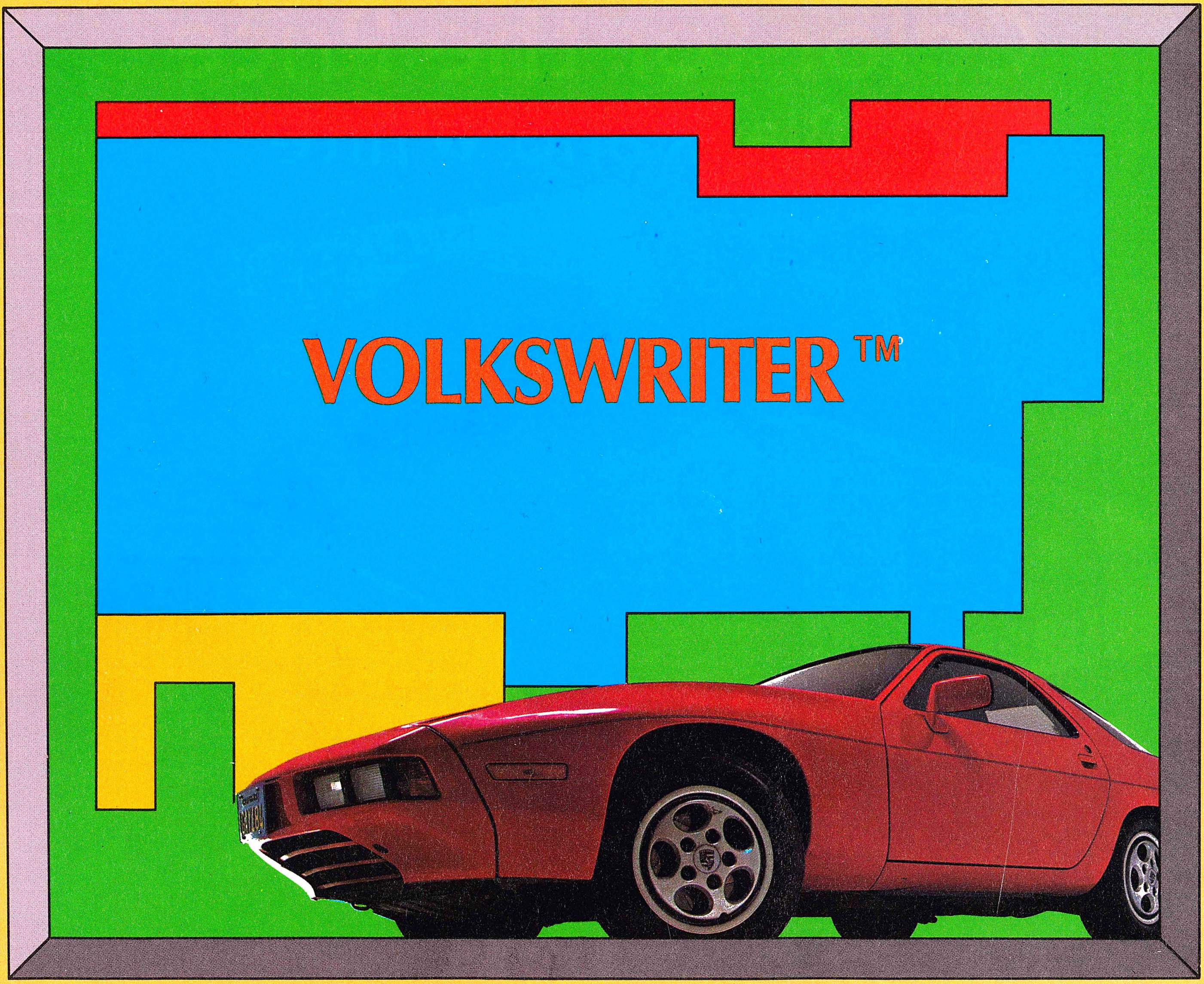

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The Real-Number Nitty Gritty

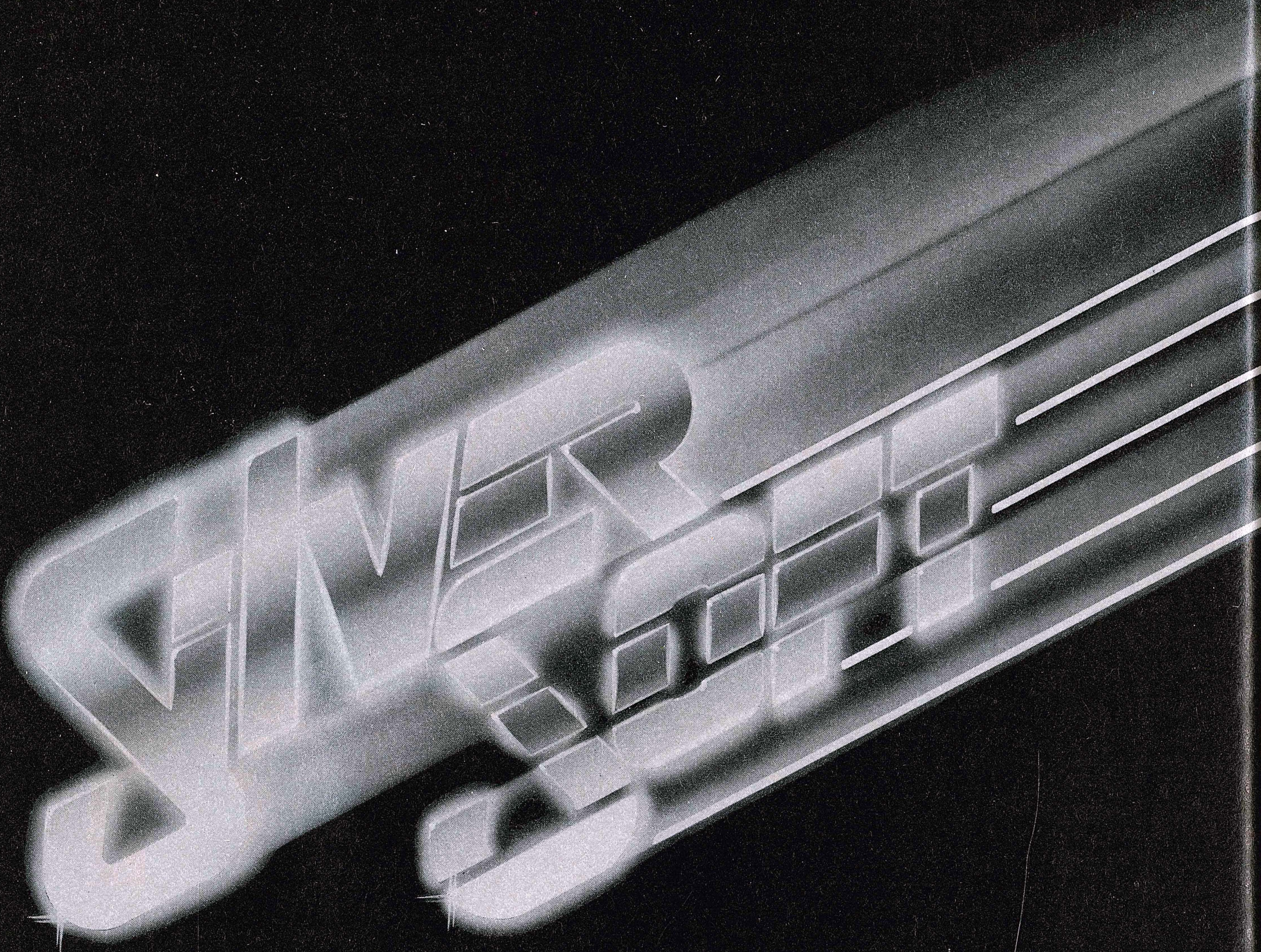
HOW BASIC STORES NUMBERS

by Gary Little

Computers recognize two essential kinds of numbers: integers and so-called *real* numbers. Integers are all the positive and negative whole numbers, including zero. Because these numbers have no fractional component, they can be converted from decimal notation to binary and stored in a computer without loss of accuracy due to rounding or truncation—provided that the integers are within the numeric range supported by the computer.

Real numbers, in contrast, do include a fractional component; the fractional component may be zero (as in 32.0 or −1.00000), but even if it's zero, the real number must be represented in the computer as a whole number plus some fractional amount. Unless the real number happens to be an exact power of two (or happens to be exactly equal to a sum of powers of two), its conversion from decimal notation to binary will result in some degree of approximation. Because of this approximation, you will sometimes find that if you multiply a number by its reciprocal in Basic, the calculated result will not equal the original number.

Illustration by Weldon O. Lewin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Your pc's Basic interpreter supports two types of real numbers, called single-precision and double-precision. Both types are stored internally in the interpreter's simple variable and array variable data areas in a format called *floating point*. This article will provide some details about the floating-point storage format.

This information will be of interest mainly to those who write 8088 assembler routines that are to be called from Basic programs. The Basic *call* statement can pass string or numeric parameters as arguments. When a called machine-language program takes control, the addresses of any parameters can be found on the stack; Appendix C of the IBM Basic manual provides complete details.

People who deal with very large or very small numbers often write them in a style called scientific notation, which looks like this:

134.56 X 10^6

This representation consists of three elements. The first, the 134.56 in our example, is called the *mantissa.* The third, the 6, is the *exponent.* The second element, the 10, is called the *base.* Garden-variety scientific notation always uses 10 for the base, so you could say that a certain number has a mantissa of 134.56 and an exponent of 6, and people would generally understand that you were describing the number 134,560,000.

Scientific notation is great for indicating the mass of a neutron or the diameter of a galaxy. It makes such numbers take up less room on the page, and it enables a reader to comprehend their magnitude without having to count digits or commas. But this style of number representation can also be used for quantities of commonplace dimension, like 7.3 or −121.315. And, in fact, this is the method by which the Basic interpreter stores all real numbers.

Single-precision real numbers are stored in a four-byte format, in which one byte is used for the exponent and the other three for the mantissa. The byte with the highest-numbered address is the exponent byte. The value stored there is not the exponent itself, but rather the exponent plus 129; because of this, the exponent is said to be "biased" by 129.

Before a number is stored in the binary floating-point format, it is "normalized." Normalization is the process whereby the binary point (analogous to the decimal point in a decimal number) is adjusted so that there is a 1 to its immediate left and no others to the left of that.

The easiest way to understand normalization is by means of an example. Let us take an arbitrary binary number—say, 1101.11. To normalize this number we'd need to move the binary point three positions to the left. In order to do this without affecting the value of the number, we'd need to increment the exponent (now 0) by 3.

If it's not clear why you'd raise the exponent by 3, return for a moment to the familiar world of decimal numbers. If you took a decimal number, like 3567.9, and moved its decimal place three positions to the left, you'd be decreasing its value by a factor of a thousand; to move the decimal point three columns leftward without changing the value of the number, you'd need to remultiply the original number by a thousand—ten to the third power—which is to say you'd need to increase its exponent from 0 to 3.

Because the Basic interpreter always normalizes a real number before storing it, all significant digits in the number will appear in the mantissa, and they will all appear to the right of the binary point. This fact is important, because it permits the interpreter to treat that 1 to the left of the binary point as implicit, or understood; in other words, because all real numbers stored by the interpreter have a 1 to the left of the binary point, the interpreter doesn't actually need to store the 1.

Single-Precision Numbers. The sign of a single-precision number is stored as the high-order bit of the third byte. If this bit is 1, then the number is negative; if it is 0, the number is positive. The first two bytes and the remaining seven bits of byte 3 represent the

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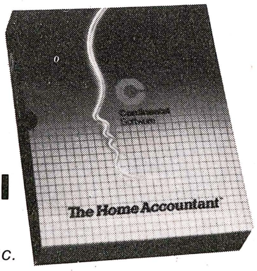

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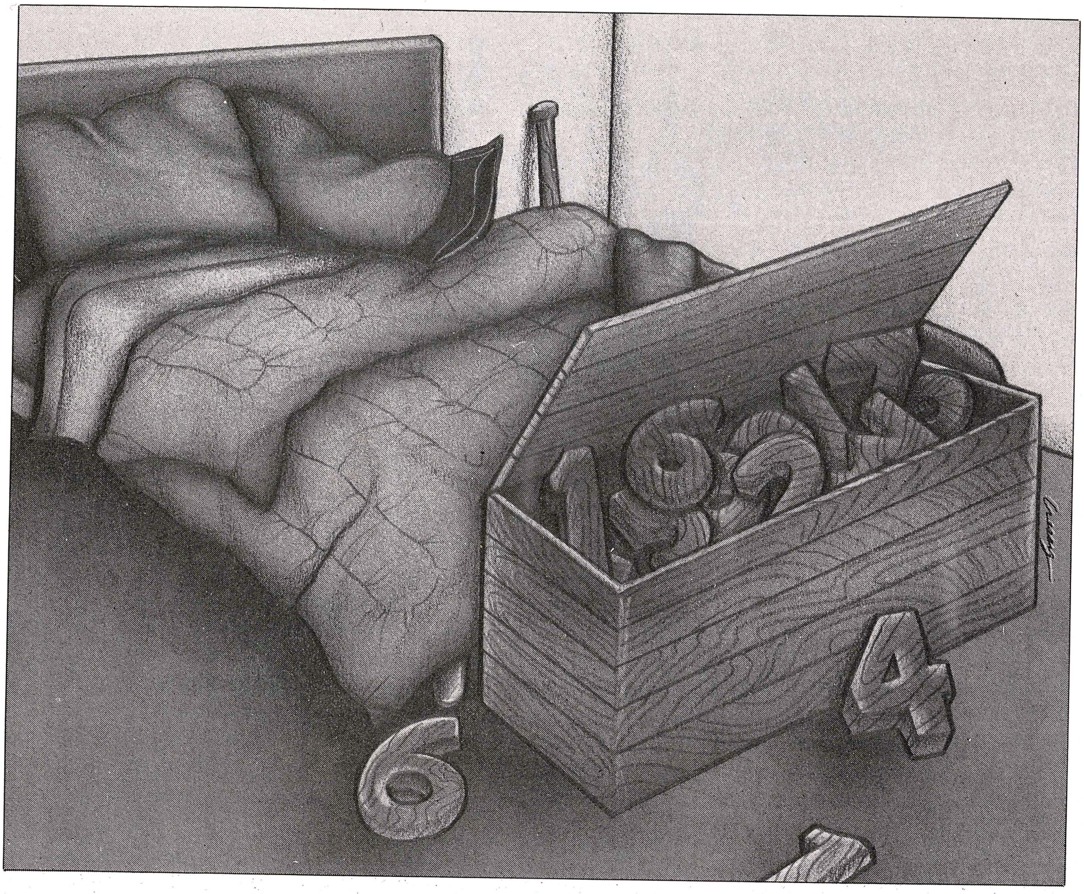

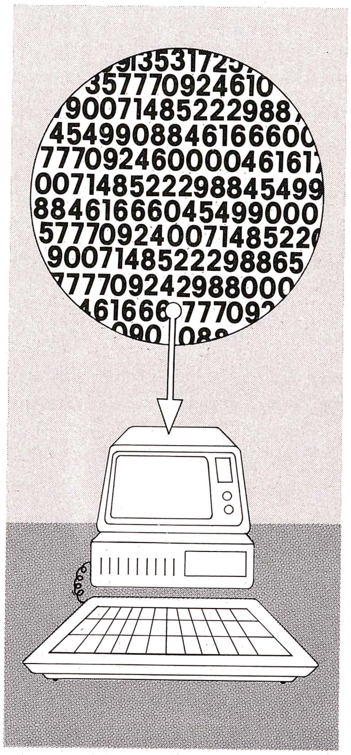

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mantissa of a single-precision number, stored least significant byte first. The fourth byte, you'll recall, holds the value of the exponent, increased by 129.

The decimal range of numbers that can be stored in single-precision binary floating-point format is:

+/− 2.938736E−39 to +/− 1.701412E+38

To calculate the decimal value of a number from its binary format, multiply the value of each mantissa bit by its corresponding binary weight, add 1 (which is implied), and then multiply the total by 2 raised to the value of the exponent byte (less 129). The binary weight of a particular mantissa bit is given by the formula (1/2)∧(BN−21), where BN is the bit number (within the overall four-byte group). The bit numbers range from 22, the most significant bit (which is the sixth bit of byte 3) to 0, the least significant (the zeroth bit of byte 1).

As an example, consider the decimal number 5.35. In hex notation, its storage by Basic looks like this:

Byte 1	Byte 2	Byte 3	Byte 4
33H	33H	2BH	83H

and its actual binary form is

Byte 1	Byte 2	Byte 3	Byte 4
00110011	00110011	00101011	01000011

Remember that byte 4 represents the exponent and the three bytes holding the mantissa are ordered least significant byte first. Recall, too, that the exponent has been increased by 129, the most significant bit of byte 3 indicates the sign (0 if positive, 1 if negative) and there's an implicit 1 to the left of the binary point. So, to convert this series of bits to a decimal number, start by rearranging it thus:

+1.0101011 00110011 00110011 * 2 ∧ (83H−81H)

Now you can apply the formula from a few paragraphs back to come up with the following:

**1 + (1/2)∧2 + (1/2)∧4 + (1/2)∧6 + (1/2)∧7 + (1/2)∧10 +
(1/2)∧11 + (1/2)∧14 + (1/2)∧15 + (1/2)∧18 + (1/2)∧19 +
(1/2)∧22 + (1/2)∧23**

Calculate this quantity and you'll get 1.3375. Then multiply 1.3375 by the exponential part of the number (which is 2 to the power of 2, or 4) and you'll get the final result: 5.35.

In this case, the calculation is exact; however, as we saw at the beginning of this article, the conversion process will not always be exact, because rounding errors may be introduced when the original number is converted to its binary format. The percentage error in any case will be small (smaller, incidentally, for double-precision numbers than for singles).

Double-Precision Numbers. Double-precision numbers are stored in a manner similar to that used for single-precision numbers, except that eight bytes are used instead of four. The additional four bytes are used to extend the mantissa.

In double-precision, the eighth byte is the exponent byte, and the high-order (most significant) bit of the seventh byte holds the sign information.

The decimal range of numbers allowed in double-precision floating-point format is:

+/− 2.938735877055719D−39 to
+/− 1.701411834604692D+38

The most significant bit of a double-precision number is bit 30 (bit 6 of byte 7) and the least significant is bit 0 (bit 0 of byte 1). Thus, double-precision numbers are stored with thirty-two bits of precision (including the implicit 1 to the left of the binary point). ▲

Gary Little is a lawyer practicing in Vancouver, British Columbia; his specialty is computer law.

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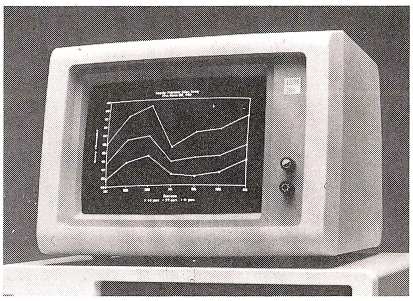

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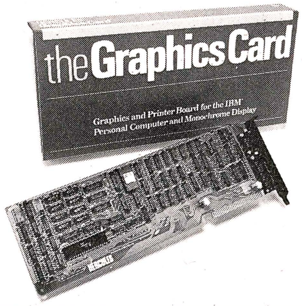
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A PALETTE FOR YOUR PROSE

by George Bohannon

ADD COLOR TO YOUR TEXT

If you own a hi-res color monitor, you're probably fed up with colorless text from your software. As you'll see, it's easy to obtain color text, even from programs that weren't designed to write in color. And you don't have to modify your programs.

Unfortunately, much of the software available for the pc fails to use the color capabilities of the computer. Perhaps that's because those programs were developed on a monochrome monitor; or maybe it's because the use of color requires extra effort on the part of the programmer. Whatever the reason, the user suffers.

In addition to making software more pleasant to use, color can increase your awareness and decrease your response time. Color can very effectively emphasize specific regions of the screen and make changes in text more apparent. Of course, the most effective use of color requires careful planning by the programmer.

Okay. But what about all that colorless software already out there? The task of obtaining color text from a program that's already compiled and doesn't already write in color is an illuminating one. A way of doing it is provided below.

But first, to understand the problem more fully, let's consider how the pc creates color text.

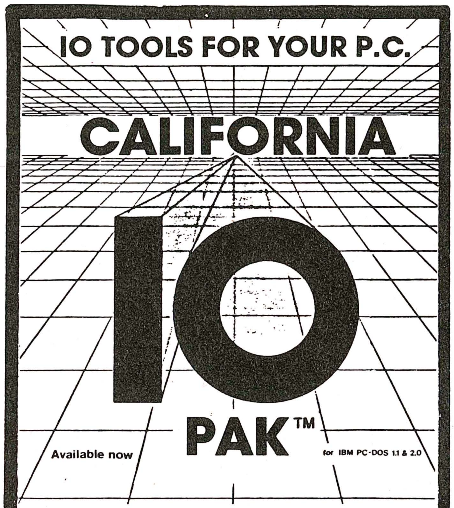
Colorful Language. To obtain color text from the pc, you'll need a color display adapter and a color monitor or color TV. Purchasers of the pc may select the IBM color/graphics adapter (or a graphics display adapter from another company, such as the Plantronics Colorplus) or the IBM monochrome display adapter—or both. Each adapter has certain advantages, but only the color/graphics adapter can produce color.

The color/graphics adapter has two display modes—text and graphics. We'll concern ourselves here with the text mode.

In color text modes, the background and foreground colors are determined by what are called *character attributes*. Each character position on the screen has its own attribute, which occupies one byte of memory, adjacent to the text byte it controls. Three bits of the attribute byte control the background color, and three other bits control the foreground color. The remaining two bits control blinking and high-intensity foreground. High-intensity background can also be obtained—at the expense of blinking.

Since a program cannot assume that the attributes have already been properly set, it must define all attributes when it begins execution. This is also true of programs written expressly for the monochrome adapter. Thus, one cannot simply put color attributes into the screen buffer before running a program and expect these color attributes to still be set when the program is run.

Fortunately, there is a way to coax most programs into writing in color, and this is one place where the foresight of the pc's designers becomes evident. The key is that



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most programs use BIOS to do screen control.

BIOS is a collection of routines that IBM thoughtfully included in the read-only memory of every pc. Since BIOS routines are invoked by "software interrupt" instructions (see "Snooping in ROM: The Software Interrupt," by Peter Norton, *Softalk*, February 1983), it is very easy to change the address to which control is passed when a program attempts to use one of the BIOS routines. Thus, if you don't like what BIOS is doing, you can simply write your own version of a particular BIOS routine and then tell the processor to branch to your version whenever it encounters the interrupt in question. Of course, this works only for programs that use BIOS.

A Colorful Program. The program in figure 1 intercepts BIOS video calls and redefines the character attributes to create color text. This program, which is intended to be run as a .com file, can be assembled with the Macro Assembler, then linked to create an .exe file, and finally converted to a .com file by means of Exe2bin (on the DOS disk). However, if you don't have a Macro Assembler, you can just as easily create the .com file by running the Basic program shown in figure 2.

Getting Loaded. Now try it. When you've created the program, return to the DOS command level, then load the program by typing *kolor* and pressing the enter key. This causes DOS to copy the file Kolor.com into memory and execute it. If the program was created properly, your screen should immediately switch to black characters on a white background with a blue border.

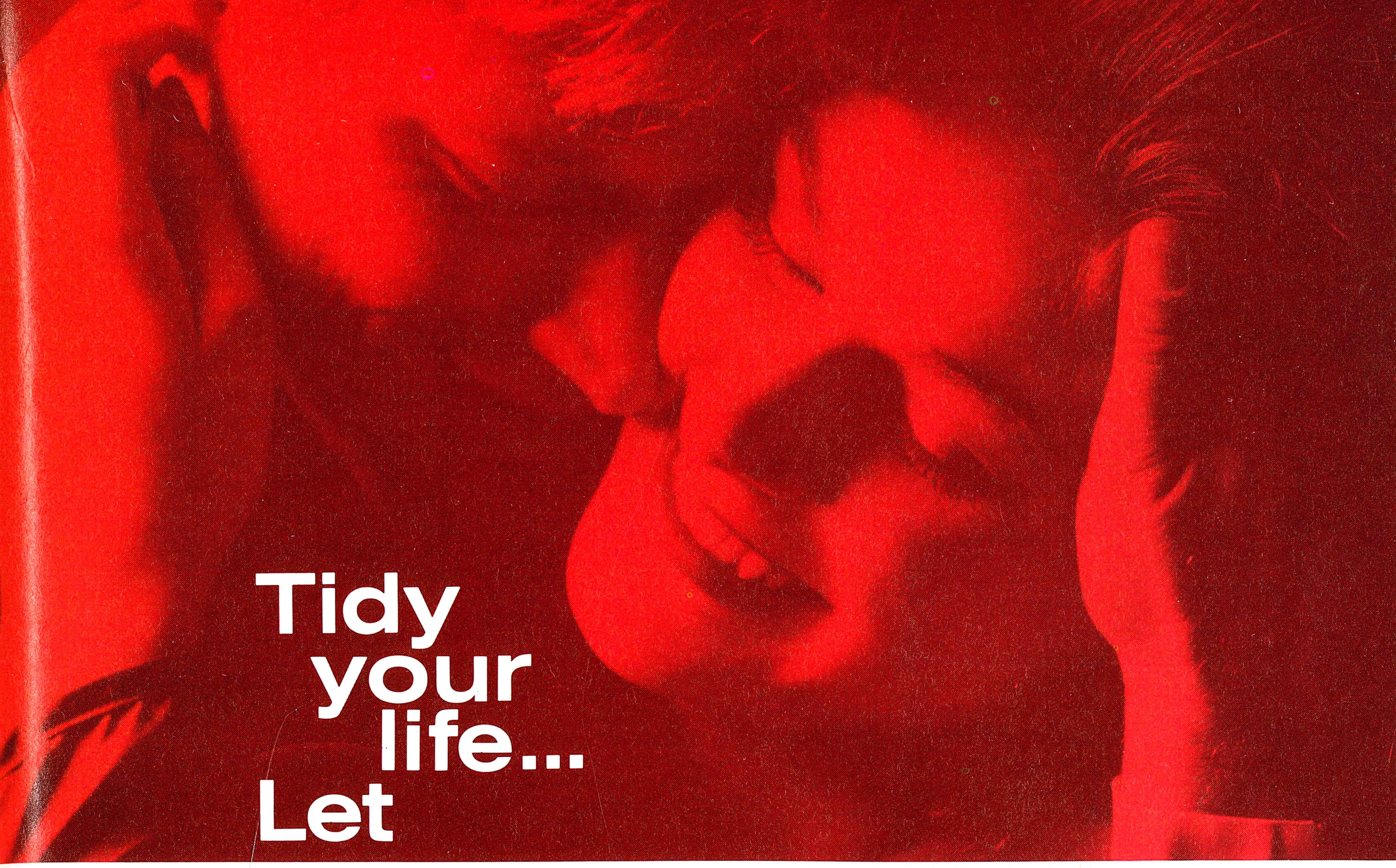
After the program is loaded, it stays in memory to intercept all BIOS video calls made by other programs. If you run Kolor again, another copy of it is stored in memory, and if you run it too many times, you'll fill up your computer's memory. Furthermore, video calls will be processed by every copy of Kolor in memory. Thus, it's best to run Kolor only once, when the computer is turned on or reset. Also, the program works in text modes only, not in graphics modes.

Now suppose you want some other combination of colors. From the assembly language listing, you may have already concluded that the variable ATTRIB, defined in the first few lines of the program, is the attribute. In that listing, 70H (the "H" means hexadecimal) is used for the attribute, giving black characters on a white background. Of this pair of digits, the left one (7 in this case) controls the background, and the right one controls the foreground. In the Basic program in figure 2, the background and foreground may be specified individually. If you would rather have blue characters, use a value of 1 for the foreground. For green characters use 2, and for red characters use 4. The border color is determined by the variable Border. The Basic manual gives a full explanation of the color codes (page 4-44). However, only the colors 0 through 7 are recognized by the Basic version of Kolor, so it's up to the application program to specify the blinking and high-intensity bits.

By adding a few lines of code, you could make some improvements to Kolor. For ex-

```
;*****************************************************************
;***                 INTERCEPT BIOS VIDEO CALLS                ***
;***            Redefines the Character Attributes             ***
;***                   Works in Text Modes only                ***
;***            Additional stack requirement: five words       ***
;***               This is a .COM program for IBM DOS          ***
;*****************************************************************

CODE     SEGMENT   PARA              'CODE'
         ASSUME    CS:CODE
         ORG       100H
KOLOR:   JMP       STRT
VIDEO    DD        00000000H         ; BIOS video entry point store
ATTRIB   DB        70H               ; white backgnd, black foregnd
BORDER   DB        01H               ; blue border
FLAG     DB        0                 ; special flag
STRT:    XOR       AX,AX
         MOV       DS,AX
         MOV       DI,40H            ; video interrupt vector location
         MOV       SI,OFFSET VIDEO
         MOV       AX,[DI]           ; get
         MOV       CS:[SI],AX        ;     the
         MOV       AX,[DI+2]         ;         current
         MOV       CS:[SI+2],AX      ;                 vector
         MOV       AX,OFFSET TRAP
```



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```
        MOV     [DI],AX         ; put trap offset into vector
        MOV     AX,CS
        MOV     [DI+2],AX       ; put trap segment into vector
        MOV     AX,0003H        ; set up for 80-column color mode
                                ;       (use 0001H for 40 columns)
        INT     10H             ; indirect video call (to TRAP)
        MOV     DX,1AAH         ; last address + 1 of this prog
        INT     27H             ; terminate but stay resident

TRAP:   CMP     AH,0            ; check for video reset
        JNE     CHKSC

        MOV     AH,FLAG
        TEST    AH,01H          ; check for special flag
        JZ      RESET           ; jump if not set
        XOR     AH,AH           ; restore the register
        MOV     FLAG,AH         ; clear the flag
        JMP     VIDEO           ; jump to BIOS video

RESET:  OR      AH,01H
        MOV     FLAG,AH         ; set a special flag
        XOR     AH,AH           ; restore the register
        INT     10H             ; indirect video call (to TRAP)

        PUSH    AX
        PUSH    BX
        MOV     AH,11           ; flag to set border color
        XOR     BH,BH
        MOV     BL,BORDER
        INT     10H             ; set the border color
        POP     BX
        PUSH    DI
        PUSH    DS
        MOV     AX,0B800H       ; screen buffer location
        MOV     DS,AX
        MOV     DI,3F40H        ; last byte of the buffer + 1
LOOP:   DEC     DI              ;   (process all pages)
        MOV     AL,ATTRIB
        MOV     [DI],AL         ; put attribute into the buffer
        DEC     DI
        JNZ     LOOP            ; loop over all attributes
        POP     DS
        POP     DI
        POP     AX
        IRET                    ; return to caller

CHKSC:  CMP     AH,6            ; check for scroll up
        JE      SCROL
        CMP     AH,7            ; check for scroll dn
        JNE     CHKWR
SCROL:  AND     BH,88H          ; preserve blink and hi intensity
        OR      BH,ATTRIB       ; insert the attribute
        JMP     VIDEO           ; jump to BIOS video
CHKWR:  CMP     AH,9            ; check for write attr/char
        JNE     GOVID
        AND     BL,88H          ; preserve blink and hi intensity
        OR      BL,ATTRIB       ; shove in the attribute
GOVID:  JMP     VIDEO           ; jump to BIOS video

CODE    ENDS
        END     KOLOR
```

Figure 1.

ample, the special graphics characters and standard text characters could be written in contrasting colors. With some imagination, other variations can be created.

Personal DOS. The program discussed in this article constitutes a modification to the operating system, since the program remains in memory waiting to help interface software with the display monitor. This method of customizing IBM DOS is now common practice, probably because of the ease with which it can be accomplished. Other examples of customization are print spoolers and disk emulators. With the help of the IBM *Technical Reference* manual and a little knowledge of assembly language, it's a fairly straightforward task to design personalized changes to DOS. ▲

```
1000 '*****************************************************************
1010 '*****                    KOLOR.BAS                        *****
1020 '*****                                                     *****
1030 '*****             Create the KOLOR.COM file               *****
1040 '*****************************************************************
1050 '
1060 DEFINT A-Z
1070 DIM BYTES(170)
1080                 '*************************************************
1090 BACKGND=7       '**    BACKGROUND, FOREGROUND,                **
1100 FOREGND=0       '**    AND BORDER COLORS ARE                  **
1110 BORDER=1        '**    SPECIFIED HERE.                        **
1120                 '*************************************************
1130 SUM=0
1140 FOR I=1 TO 170
1150 READ BYTES(I)
1160 SUM=SUM+BYTES(I)
1170 NEXT
1180 IF SUM<>15252 THEN PRINT"CHECKSUM ERROR: CHECK THE
     DATA":END
1190 BYTES(8)=(16*BACKGND OR (FOREGND AND 127)) AND 255
1200 BYTES(9)=BORDER AND 255
1210 OPEN "KOLOR.COM" FOR OUTPUT AS #1
1220 FOR I=1 TO 170
1230 PRINT #1,CHR$(BYTES(I)); ' The semicolon is essential
1240 NEXT
1250 CLOSE
1260 END
1270 DATA  235,    8,  144,  101,  240,    0,  240,  112
1280 DATA    1,    0,   51,  192,  142,  216,  191,   64
1290 DATA    0,  190,    3,    1,  139,    5,   46,  137
1300 DATA    4,  139,   69,    2,   46,  137,   68,    2
1310 DATA  184,   52,    1,  137,    5,  140,  200,  137
1320 DATA   69,    2,  184,    3,    0,  205,   16,  186
1330 DATA  170,    1,  205,   39,  128,  252,    0,  117
1340 DATA   72,   46,  138,   38,    9,    1,  246,  196
1350 DATA    1,  116,   12,   50,  228,   46,  136,   38
1360 DATA    9,    1,   46,  255,   46,    3,    1,  128
1370 DATA  204,    1,   46,  136,   38,    9,    1,   50
1380 DATA  228,  205,   16,   80,   83,  180,   11,   50
1390 DATA  255,   46,  138,   30,    8,    1,  205,   16
1400 DATA   91,   87,   30,  184,    0,  184,  142,  216
1410 DATA  191,   64,   63,   79,   46,  160,    7,    1
1420 DATA  136,    5,   79,  117,  246,   31,   95,   88
1430 DATA  207,  128,  252,    6,  116,    5,  128,  252
1440 DATA    7,  117,   13,  128,  231,  136,   46,   10
1450 DATA   62,    7,    1,   46,  255,   46,    3,    1
1460 DATA  128,  252,    9,  117,    8,  128,  227,  136
1470 DATA   46,   10,   30,    7,    1,   46,  255,   46
1480 DATA    3,    1,
1490 '
1500 '
1510 '
```

Figure 2.

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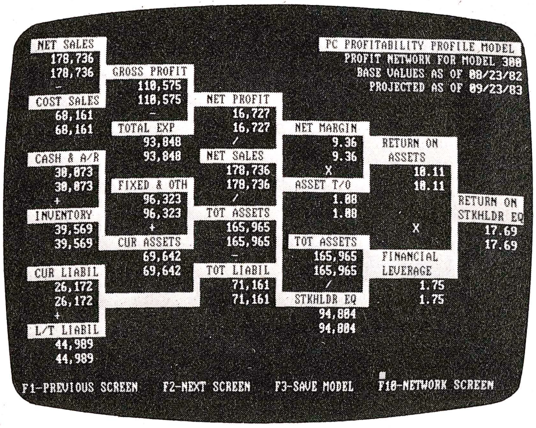
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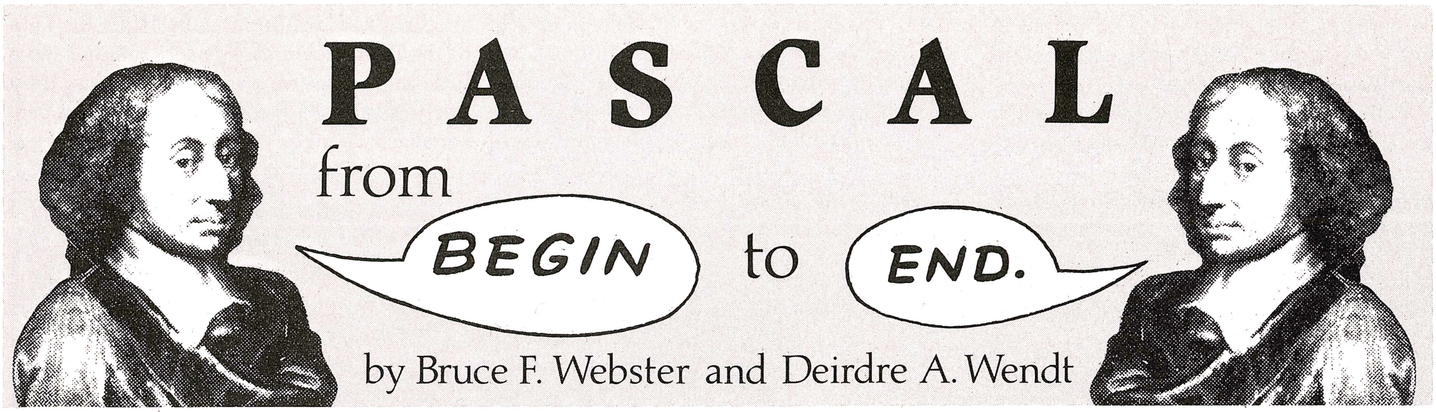

PASCAL from BEGIN to END.

by Bruce F. Webster and Deirdre A. Wendt

Last month, we introduced three advanced Pascal data structures: *arrays*, *records*, and *sets*. An array is a collection of identical data structures, each one referenced by a unique index value. A record is a grouping of (not necessarily identical) data structures, each one referenced by a unique name. A set is, well, a set of scalar values, just like those sets you learned about in junior-high math. All three can be very useful in your programs.

This month, we'll go on to a few more advanced topics dealing with these data structures. First, we'll look at the *with* statement and how it is used. After that, you'll learn how to define *variant records*, records with conditional subfields. Next, we'll get into *packed data structures*, which will allow you to conserve memory. Then, we'll demonstrate all of the various *set operations* that you can use to test and combine sets. Next month we'll have a sample program that demonstrates most of the things we've covered so far.

The With Statement. Let's suppose we have the following definitions:

```
TYPE
  quadrant =
    RECORD
      starbase        : boolean;
      sbx,sby         : 1..8;
      enemy           : 0..7
    END;
VAR
  sector              : ARRAY[1..8,1..8] OF quadrant;
```

We've defined an array of records that we can now use in our program. If we wished to clear the entire sector of starbases and enemy ships, we might do this:

```
FOR x := 1 TO 8 DO
  FOR y := 1 TO 8 DO BEGIN
    sector[x,y].starbase := false;
    sector[x,y].enemy := 0
  END;
```

There's no real problem with this, but you can see that for more complicated actions, you might get tired of prefixing each subfield with *sector[x,y]*. Pascal, bless its heart, gives you a way around that: the *with* statement. The *with* statement takes the form:

```
WITH <record id> DO <statement>;
```

With the *<statement>*, we can refer to each of the subfields of the *<record id>* without having to specify it each time. For example, we could rewrite our initialization code as:

```
FOR x := 1 TO 8 DO
  FOR y := 1 TO 8 DO
    WITH sector[x,y] DO BEGIN
      starbase := false;
      enemy := 0
    END;
```

Note that the *with* statement is inside of the two *for* statements. This ensures that *sector[x,y]* refers to the desired element of the array.

Variant Records. Occasionally you may define a record with redundant or mutually exclusive subfields. For example, consider the following record definition:

```
TYPE
  sides                   = (us,them);
  ship =
    RECORD
      side                : sides;
      sx,sy,qx,qy         : 1..8;
      energy              : 0..1023;
      shields,beams       : 0..255;
      missiles,mines      : 0..15;
      cloaked             : boolean
    END;
```

Now suppose that in our program, ships on our side have beams and mines, while enemy ships have missiles and cloaking capabilities. That means that each and every ship record has two unused

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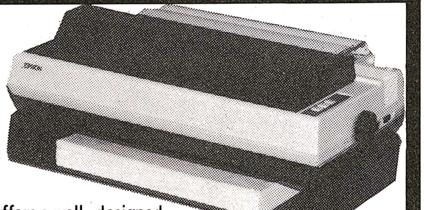

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subfields and, therefore, occasions wasted space. If you only have a few records, the space won't matter much; if you have a lot, it can become significant. Yet it seems silly to define two different records for the two types of ships. What do we do?

Well, Pascal allows you to create a record with conditional subfields, called a *variant record*. At the end of the record, you set up a *case* statement based on a subfield of the record. For each possible value of that subfield, you define the desired exclusive subfields.

For example, we might rewrite our definition of *ship* as follows:

```
TYPE
  sides                   = (us,them);
  ship =
    RECORD
      sx,sy,qx,qy         : 1..8;
      energy              : 0..1023;
      shields             : 0..255;
      CASE side : sides OF
        us    : (beams    : 0..255;
                 mines    : 0..15);
        them  : (missiles : 0..15;
                 cloaked  : boolean)
    END;
```

Now, let's say we have a variable, named *newship*, of type *ship*. *Newship* will always have the subfields *sx, sy, qx, qy, energy, shields,* and *side*. It will also have two other subfields, but which two it has will depend upon the value of *side*. If *side = us*, then *newship* will have the subfields *beams* and *mines*. If *side = them*, then *newship* will have the subfields *missiles* and *cloaked*. Indeed, if you try to reference *newship.beams* when *newship.side = them*, many Pascal implementations will give you a run-time error.

Packed Data Structures. Various dialects of Pascal allow *packed* data structures. When a data structure is packed, it uses as little memory as it can to represent each of its elements. For example, consider these two arrays:

```
VAR
  large         : ARRAY[0..1023] OF boolean;
  small         : PACKED ARRAY[0..1023] OF boolean;
```

In a typical implementation (such as UCSD Pascal), the array *large* would require 1,024 bytes of storage, one for each element in the array. The array *small*, by contrast, would require only 128 bytes (1,024 bits), since only one bit would be needed to represent each element in the array.

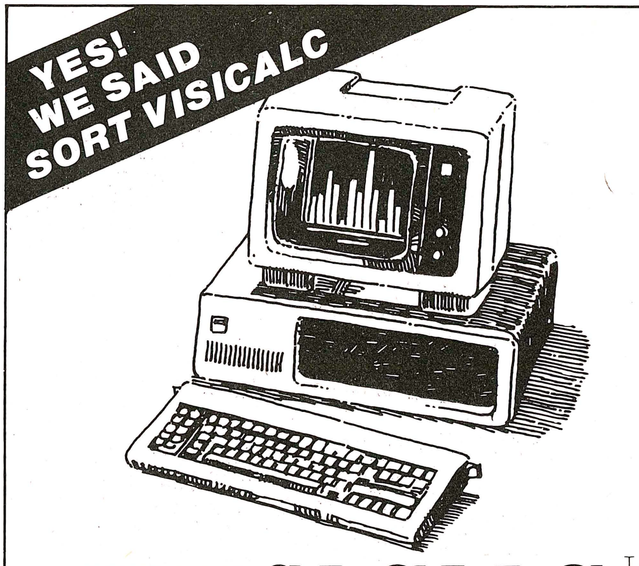
Such savings are not always available. If both *large* and *small* were arrays of type *integer*, both would require 2,048 bytes and there would be no savings at all. There are often other constraints. UCSD Pascal, for example, requires that a record (*packed* or not) take up an even number of bytes. Thus, the record

```
TYPE
  time =
    RECORD
      hours     : 0..23;
      minutes   : 0..59
    END;
```

would not benefit from being *packed*, since either way it would still require two bytes. However, this record

```
TYPE
  time =
    RECORD
      hours     : 0..23;
      minutes, seconds
                : 0..59
    END;
```

would. As it stands, the record *time* would take up four bytes, with one byte entirely wasted. But if we redefined it as a *packed record* instead, it would only take up two bytes.



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Another common constraint is that all *record* and *array* elements of a *packed record* be themselves *packed*. Thus, if we had

```
TYPE
  time =
    RECORD
      hours            : 0..23;
      minutes,seconds
                       : 0..59
    END;
  status =
    PACKED RECORD
      curtime          : time;
      name             : ARRAY[1..10] OF char;
      wounds,fatigue,hunger
                       : 0..15
    END;
```

many Pascal implementations would treat *status* as not being *packed*, since it contains *record* and *array* subfields that aren't *packed*. Instead, we would need to define

```
TYPE
  time =
    PACKED RECORD
      hours            : 0..23;
      minutes,seconds
                       : 0..59
    END;
  status =
    PACKED RECORD
      curtime          : time;
      name             : PACKED ARRAY[1..10] OF char;
      wounds,fatigue,hunger
                       : 0..15
    END;
```

in order for *status* to be treated as a *packed record*.

Since *packed* data structures are obviously so nifty, why not always use them? First, they save memory at the expense of speed, since more internal calculation must be done to get at a given element. Second, they often come with limitations on use as parameters in *procedure* and *function* calls, though this varies from implementation to implementation. Third, they aren't always available. For example, IBM Pascal will allow you to define *packed* data structures but does not do any packing at all. Still, if *packed* structures are available, they can be valuable in minimizing the amount of space needed for files or large data structures.

Set Operations. As has been mentioned, sets represent collections of values of a scalar data type (integer, boolean, char, or an enumerated data type). We showed last month how to test if a given value is in the set, but there are actually several set operations and tests available. Consider the following program:

```
PROGRAM set_test;
TYPE
  charset                    = SET OF char;
VAR
  set1,set2,set3,set4        : charset;
  ch                         : char;
  flag                       : boolean;
BEGIN
  set1 := ['A'..'Z','a'..'z'];
  set2 := ['0'..'9','A'..'Z'];
  set3 := set1;              (* assignment *)
  (* set3 = ['A'..'Z','a'..'z'] *)
  set3 := set1 + set2;       (* set union *)
  (* set3 = ['0'..'9','A'..'Z','a'..'z'] *)
  set3 := set1 - set2;       (* set difference *)
  (* set3 = ['a'..'z'] *)
  set3 := set1 * set2;       (* set intersection *)
  (* set3 = ['A'..'Z'] *)
  set3 := ['a'..'c'];
  flag := set3< = set1;      (* subset *)
  (* flag = true; set3 is a subset of set1 *)
  flag := set3< = set2;      (* subset *)
  (* flag = false; set3 is not a subset of set2 *)
  ch := 'a';
  flag := ch IN set1;        (* inclusion *)
  (* flag = true; 'a' is an element of set1 *)
  flag := ch IN set2;        (* inclusion *)
  (* flag = false; 'a' is not an element of set2 *)
END. (* of PROGRAM set_test *)
```

As you can see, Pascal has operators for union, difference, and intersection of sets. You can also test if one set is a subset of another or if a particular element is a member of a set. Finally, some implementations of Pascal include an *any* function, which returns the lowest ordinal element of a given set. For example, *ch := any(set1)* would set *ch* equal to '0'.

Sample Program. Next month we'll start with a sample program that uses advanced data types. The program, a simple example of the old *Star Trek* genre, will not be a complete, entertaining game; it may, however, give you a starting point from which you can write your own game. ▲

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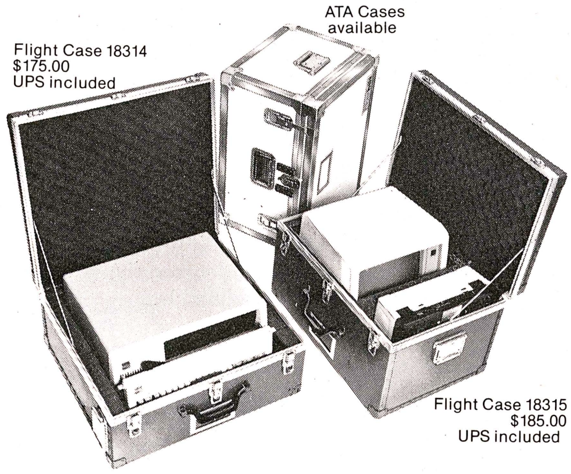
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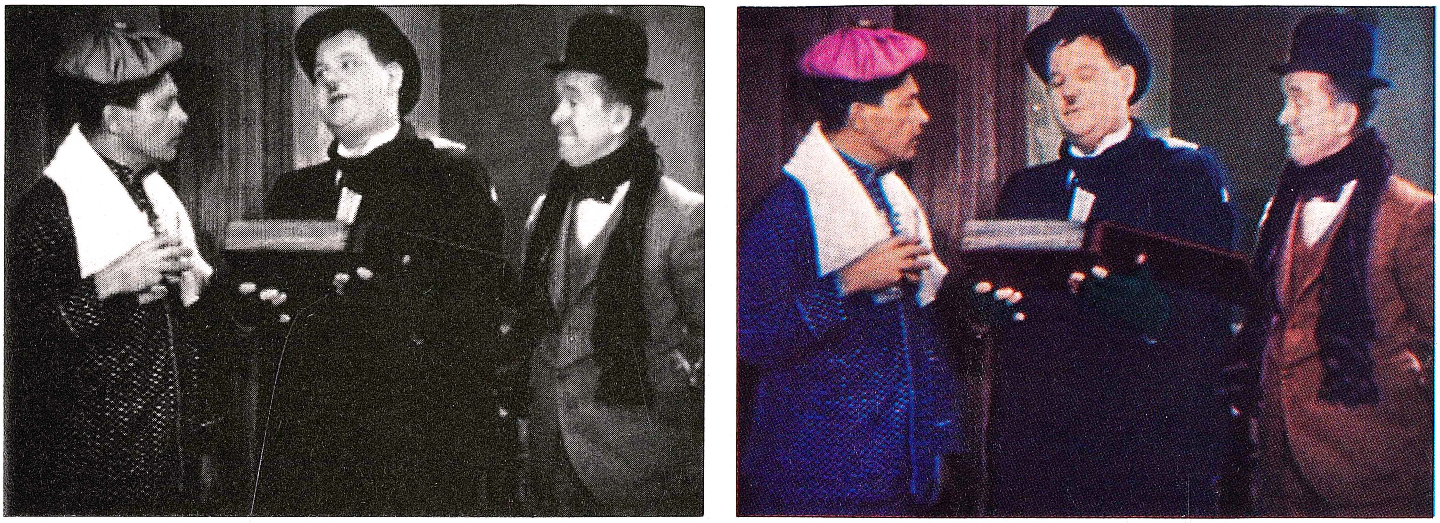

Δ **Adding Color to Old Flicks.** The year is 1935. The scene on screen is from a classic comedy short, "The Fixer Uppers," starring Stan Laurel and Oliver Hardy. Typical of Laurel and Hardy films (even those from the talking pictures era), "The Fixer Uppers" depends a lot on sight gags, Laurel's sneaky expressions, and Hardy's pompous mannerisms.

Now look again. It's 1983 and something strange is going on. In a new version of "The Fixer Uppers" Laurel is wearing a brown suit and blue hat while Hardy sports green gloves and a dark blue suit. What makes this strange is that "The Fixer Uppers" was originally filmed in black and white.

Laurel and Hardy films are the first from the Hal Roach Studios film library to be converted from black-and-white film to color videotape. Ever since the early days of one-color tinting and three-strip Technicolor, the film industry has labored mightily to bring color to the cinema. By far, the majority of films made in Hollywood in the last seventy years are black and white. Only in the last thirty years has the economics of film processing made color film cheaper than black and white.

Now, with the help of computer and video technology, there's a movement afoot to add color to many early black-and-white films as well as to certain old television programs. At present, Hal Roach Studios, through its subsidiary Vidcolor, has cornered the market on converting films. Vidcolor's Wilson Markle says he knows of no other comparable systems for adding color.

Earl Glick, chairman of the board at Hal Roach Studios, feels that network television, pay TV, and home video-cassette players are all potential markets for the color-enhanced films. "Most of the major studios and networks have shown an interest," says Glick.

The process, which is fairly simple, involves a minicomputer for number-crunching, a specialized image processor, and a computer operator who must stay alert. First, a film is transferred to videotape and broken down by scenes. Then the elements of each scene are entered into the computer. An art director then coordinates the color information, which is also entered into the computer.

Once it has the color information and the original black-and-white information, the computer matches them and sends the combined result to the specialized image processor. This device creates a new videotape with the desired colors added in.

Some of the process is automated. In simply constructed scenes where the elements do not change much, it's possible to define colors in only the first frame and the computer will add color to all the other frames in the scene automatically. When a scene includes pans, zooms, or tilts, the task is a little more difficult, sometimes requiring the computer operator to make adjustments during the process. "The speed of the process depends entirely on the complexity of the scene," says Markle.

"Once we get a dedicated facility for this project, it'll take seventy-two to ninety-six hours to convert one hour of film—or around two-and-a-half seconds per frame."

According to Glick, advertising agencies have recognized the advantages of this computerized coloring. He recalls one incident where a commercial was filmed using a white

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bottle. Later the producers wanted the bottle changed to brown. Rather than spend the time and money to reshoot, the client had the bottle recolored electronically by Vidcolor.

Glick intends eventually to color all the films in the Hal Roach film library. At the moment, the Laurel and Hardy classics, *1 Million B.C.*, and *Topper* are taking top priority. Glick believes there are no black-and-white films that would not benefit from this process.

''Black and white is not natural,'' Glick says. ''We do not see in black and white, we see in color.'' Most old movies were filmed in black and white because color technology was not available, was not refined, or was too expensive.

''It's all a matter of volume,'' says Markle. And, he adds, Vidcolor is currently looking for a faster computer. Soon the company will be able to increase its workload, thereby lowering the cost to the client. ''We are going to be upgrading and maintaining our software. The final product is eventually going to look as if it were originally photographed in color.''

Currently, Hal Roach Studios seems to be the only major film library committing itself to an effort of this kind. When asked about the possibilities of adding color to old films, Daniel Slusser, vice president and general manager of Universal Studios noted, ''It's an interesting concept and it may have value. There are other processes out there, other variations, and we continue to look.''

Vidcolor's process is geared only to making color videotapes for television, and it may be a while before a process is worked out to color actual 35mm or 16mm film. ''I don't pretend to be able to do it for the large screen,'' says Markle. ''But I don't really see a market for that either.''

The decision to accept or reject the films lies with the networks and local stations. ''We'll be ready to go full force in late September or October,'' says Glick confidently. He also emphasizes that if, for some reason, a person does not like watching an old film in color, ''every color television set has the black-and-white option. A person can still watch it in black and white.''

Δ **Pedestrian Economics.** Four microcomputer games have been installed in the lobby of the Federal Reserve Bank of San Francisco. Hundreds of people play them every day and learn something about money.

The arcade-style games are part of an eight-thousand-square-foot permanent exhibit called the World of Economics. Together with large murals, glass-cased displays, and twelve electronic exhibits, the games give viewers an entertaining insight into economics. A total of twenty-seven displays are arranged in family groupings, such as ''money and markets'' and ''fluctuations and policy.''

The entire exhibit contains forty thousand words and is so packed with information that anyone assimilating all of it could pass the first two semesters of a college course in the principles of economics, says Kent Sims, executive vice president of the bank.

Sponsored by the Federal Reserve Bank, the $2-million educational exhibit was assembled by Howard Lathrop & Associates, a Santa Monica, California-based design firm. It took three and a half years to complete.

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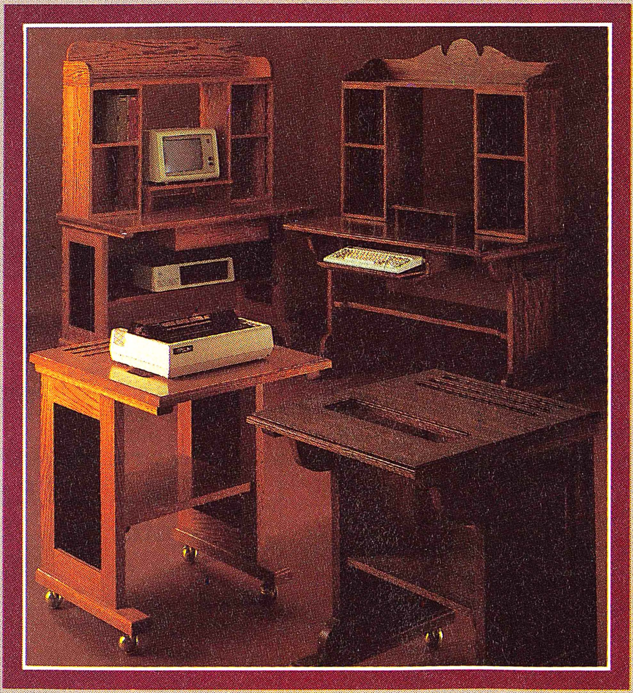

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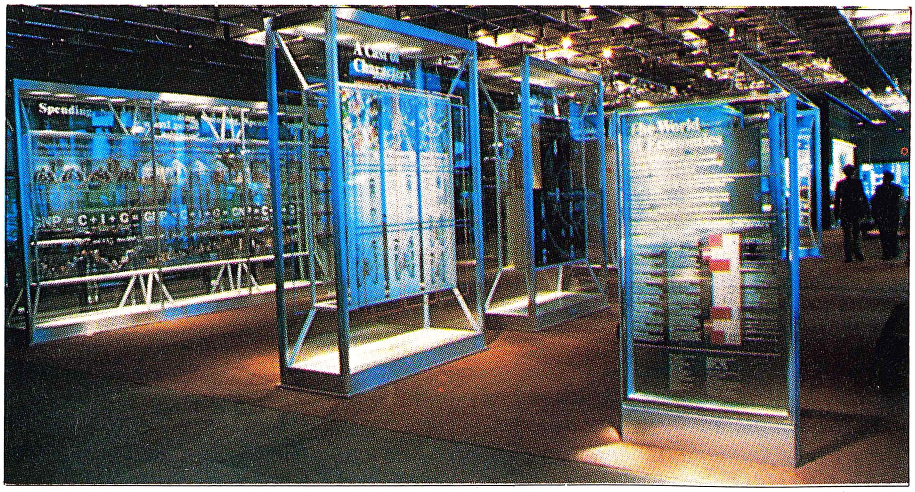

John Scadding, director of public information, was the bank's liaison on the project.

Naturally, the games are very popular, says Scadding. "But I'm continually surprised to see people standing around and reading parts of the display. We were warned not to use a lot of words and to keep it interactive. I'm heartened to see people studying it quite intently."

The four games run on Radio Shack microcomputers. One is *The Election Game*, in which the player becomes the President, juggling taxes and government spending in a valiant attempt to control inflation and deflation.

Another is *The Monetary Policy Game*. Here the player becomes chairman of the Federal Reserve Board, a job that demands juggling the country's money supply by buying and selling government securities. The object is to avoid inflation while at the same time staving off unemployment.

Winning at the *Policy* game is as difficult as it is in real life. When executive vice president Sims played the game, it fired him as head of the Federal Reserve Board when unemployment ran amok.

The Constraints Game is a shoot-'em-up that depicts the uncertainty faced by economic policy-makers. A rocket-firing spaceship disappears (policy makers don't always have the information they need), ships fire with unpredictable force (policy makers can't rely totally on past experience), there are time lags between pressing the button and firing (policy makers don't know how long it will take for their decisions to affect the economy; and ships jerk uncontrollably—there is no absolute control of the economy).

The game *Muffin Mogul* turns players into bakery shop owners. Controlling the muffin prices based on cost of ingredients and the weather (more muffins are sold on sunny days) is a lesson in the principles of supply and demand.

Two LED displays prompt viewers to push a button and see how the economy flows. Another display shows how dollar bills circulate in the economy.

The exhibit came about as a result of San Francisco zoning laws, which require that buildings of a certain height offer something that contributes to the pedestrian life of the street they're built on. "The fact that we're a Federal Reserve bank," says Scadding, "made us aware that we could show people what the Federal Reserve does."

The Federal Reserve Bank decided to build an educational economy-oriented exhibit instead of the usual restaurant or flower shop. "Of course, we also decided we should make it fun, large, colorful, and exciting," he adds.

School tours of the exhibit are being arranged. And to help students and the general public through the maze of information, the Economic Literacy Council of California is developing printed directories.

Δ On the Road to an Information Society. The recent publication of *Fortune* magazine's list of the five hundred largest industrial companies underscores the changing nature of America's economy.

It's become fashionable to call the economic metamorphosis either a move to a postindustrial society or a move to an information-based economy. But whatever name is used to describe the shift in industrial emphasis, one thing stands out: The technology companies are growing at a relatively faster rate today than companies in more traditional industry groups. That trend implies an accelerated rate of change toward a new economic base.

No matter how you sort out the industrial groups, computer firms and allied technological companies are the only group in this year's "500" that uniformly advanced in the rankings. Nary a company that could reasonably fall into that category failed to rise at least two positions on the list. Understand that such an assertion omits companies whose major technological marketplace is aerospace.

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puter-technology companies with primarily commercial civilian customers. And those companies are uniformly climbing up the ranks of *Fortune*'s 500.

Leader of the high-tech bunch, of course, was IBM, which moved from eighth to sixth, passing Standard Oil of California and Standard Oil (Indiana) in the process. IBM reported sales in 1982 of $34 billion, including an estimated $500 million from the sale of the IBM Personal Computer.

One of the more interesting movers was Control Data, which moved from one hundred forty-fourth to eightieth, leapfrogging such companies as Hewlett-Packard, Burroughs, Warner Communications, and Digital Equipment Corporation in the process.

Most industry interest, however, was focused on the arrival of Apple Computer in position 411. Arriving a mere seven years after its inception, Apple became the youngest company ever to earn a spot on the 500 list.

That achievement was a watershed, in that it completed the tasks that former Apple president Mike Markkula had set for himself. Just days prior to the release of the *Fortune* report, Markkula stepped down as chief operating officer in favor of John Sculley, former president of Pepsi-Cola Co.

Another newcomer to the *Fortune* 500, Coleco, was enjoying the rarefied heights of 444th and a big jump in first-quarter earnings. Many investors weren't convinced, however; short sales of the stock remained at a high level.

It seems that sales of game cartridges have plummeted from over eight million units in the latter half of 1982 to two million units in the first quarter of this year. While some of that slump was expected because the peak sales were reached during the Christmas holiday buying spree, investors appear wary of the company. Not to worry, claims company chief Arnold Greenberg, Coleco's new home computer will come to the rescue.

How the firm's entry in the low end of the computer market will strengthen the company is a matter of some puzzlement, considering that the established contenders in that market are already having trouble making ends meet. Texas Instruments merely pushed money around during their first quarter. TI reported sales of slightly more than $1 billion, but only about $7 million stuck to the company coffers. Returns of less than one percent won't lessen the short-sale pressure on any stock.

On the other hand, TI looks like a well-managed company next to their competitor from Warner Communications, Atari. Atari's situation gets worse with every sunrise. Late last year, it was the sad tale of a weaker-than-expected holiday surge that would lower earnings. Now Atari is a flat-out losing proposition. Warner Communications as a whole reported losing some $19 million in the course of the last three months, while the Atari division alone took something resembling a $45 million bath. Like Coleco, Atari has lots of cartridges in warehouses instead of in users' hands. Unlike Coleco, Atari can't promise to get into the computer business to salvage the situation—it's got three models out there already.

If these tales seem to run counter to the earlier proposition that the United States is now hastening toward a postindustrial society, be not misled. They merely illustrate that, even in Wonderland, some folks can get themselves in trouble.

Higher-end competitors don't seem to be having difficulties of this sort. Markkula, for instance, is not yielding up a turnaround situation to Sculley at Apple. The Cupertino firm reported significantly stronger sales and earnings for their first half, mostly fueled by sales of the Apple IIe.

How strong was Apple? Well, sales for the first six months were approximately half of IBM's profit for the first quarter of 1983.

Big Blue came home with equally sharp increases in sales and profits, just missing scoring a $1 billion net in the quarter. And their sales of $8.28 billion for the quarter were just a tad less than the sales of Xerox for all of last year. In fact, the quarter was so strong that IBM chairman John Opel hazarded a guess that the period kicked IBM's "business off to a healthy start in 1983." Let no one accuse Opel of overstatement.

The mammoth-system folks got in their own licks. Cray, maker of maxi mainframes, reported higher sales and earnings as well. The Minneapolis firm reported profits of around $2 million and speculated they might sell as many as sixteen computers this year. That's hardly like selling thousands of TI 99/4As, but it seems to be nearly as profitable.

Δ **Government Computer Stores?** The federal government's office supply sergeant, the General Services Administration (GSA), hopes to open a computer store this September.

To be called the Information Product and Training Center—or something friendlier if they can think of it—the privately operated emporium will occupy 3,000 square feet of the agency's headquarters in Washington, D.C.

GSA, which is currently evaluating vendor bids to run the business, made the unprecedented move in response to an unprecedented fact of modern life—the computer.

"Microcomputers are forcing the private sector and government to rethink how they do business," notes GSA project manager Bill Frazer. "We have to try new techniques to get a handle on it, because the old techniques aren't working effectively."

In the past twenty years, the federal government has purchased eighteen thousand general-purpose computers—mainframe, mini, and micro, according to Frazer. But in the next seven years, it's estimated Uncle Sam will procure 500,000 to one million units. Many of those will probably be microcomputers, earmarked for short-handed managers who are under budget pressure to operate more efficiently.

It is the agency's hope that the store will create excitement among the mid-level nontechies who need a convenient and friendly place to shop for business tools. "There's a great deal of inertia that prevents the end-user manager in government from getting the product he wants," says Frazer. Part of that is bound up with the mystique of the computer and computer stores, but it's also tied to the lingering suspicion among bureaucrats that government red tape will frustrate purchasers.

Vendors bidding for the computer-store contract, therefore, are being evaluated not just on their ability to deliver a varied product line in machines and programs, says Frazer, but also on their willingness to hold a bureaucrat's hand.

"With the procurement schedule we use now, when you buy something, you buy a piece of hardware," Frazer explains. "You don't necessarily get it all tied together—hardware, software, recommendations on what to buy, training, and ongoing maintenance. They all come from different places."

News of GSA's decision to get bids on the store—which could do from $1 million to $5 million in business its first year—was not warmly received in the nation's capital. Area vendors, particularly those who do not carry an extensive product line, decried the project as socialistic and unfair, but Frazer thinks that view is shortsighted because there's more than enough business to go around. The store does represent competition to local dealers, he concedes, but government agencies are not under any obligation to make their computer purchases through the store. They can still procure equipment directly through dealers whose salespersons make the agency rounds or through a GSA-approved discount catalog in which many of these same area dealers are listed.

Although initial news accounts reported that the store was to be one of several, Frazer says that only the headquarters project is scheduled at this time. That leaves open the question of whether more such outlets could follow but Frazer, emphasizing the pilot nature of the project, acknowledges another scenario. "It's also possible we'll find this was not the best idea we could have come up with."

Δ **Robot Cop.** The long arm of the law has been strengthened in the City by the Bay.

San Francisco police have reequipped Snoopy, a police robot, with a heavy-duty metal arm to replace the one damaged on the firing line last October.

A one-armed contraption that maneuvers on a tanklike tread, Snoopy has spent the last few years carefully hauling suspicious-looking packages to a reinforced bomb trailer. Snoopy was one of two robots donated by the International Association of Bomb Technicians and Investigators to the cities of San Francisco and San Jose some four years ago.

Snoopy's arm was damaged in duty when the robot was loaned to Oakland police to rout a berserk gunman from a liquor store. Snoopy toddled to the store entrance, flexed his hinged arm, then promptly damaged it trying to yank off the store's aluminum frame door. Undeterred, Snoopy blasted away the door lock with a shot from his built-in twelve-gauge shotgun and wheeled five feet into the store for a quick look-see with his built-in television camera. When officers monitoring the camera transmissions determined the suspect was holed up in the rear of the store, Snoopy was withdrawn from the scene.

The robot, which cost $17,000 and was produced by a now-defunct company, is manipulated via a control panel and joystick located in a nearby van. A 300-foot cable tethers it to the van.

Sgt. Greg Cash, head of the San Francisco Explosive Ordnance Disposal unit, says the machine could be used for other things besides the usual bomb work—a department workload that totaled three real bombs and sixty-five hoaxes in 1982. Possible applications, according to Cash: Enlisting robots in hostage negotiations (Snoopy has a built-in intercom) or in physically retrieving downed officers and citizens when police and citizens are under fire.

Δ **Help for the Visually Handicapped.** Over the years, business employers have attested to the productivity and dependability of handicapped workers. Even so, unemployment runs high in the ranks of the handicapped.

Apollo Electronic Visual Aids of Chatsworth, California, is working to change that—at least for the visually handicapped—by providing handicapped workers with more efficient tools designed to meet their special needs.

Since its inception twelve years ago, Apollo has worked closely with both private industry and partially sighted workers. The company has developed several electronic aids that enable the visually impaired to compete in the job market on an almost

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The Apollo Computer Terminal System (ACTS) is the latest system produced by the company and is a logical step up from the Apollo Professional Typing System, says general manager Douglas Brent.

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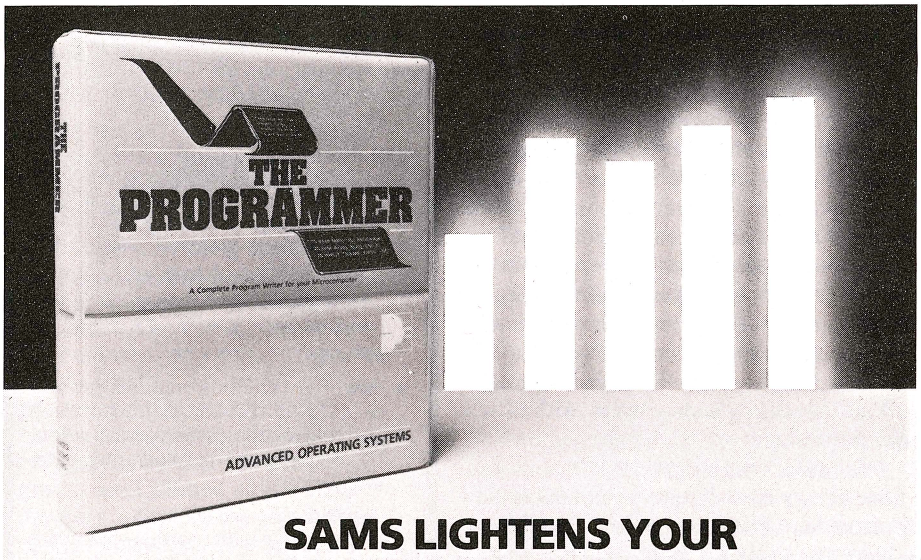
Although the initial response has been good, Brent says, "We're trying to introduce this system to companies who are already employing the visually handicapped. We haven't gotten much response from the rest of private industry."

Another potential market Brent sees are the forty or so training centers across the country for the partially sighted: "We envision this system as having a definite usefulness in education."

The ACTS sells for around six thousand dollars, and the closed-circuit video hookup costs another two thousand dollars. Brent is aware that this may seem expensive, but he believes the employer who buys the system and hires the visually impaired operator is making a good investment.

Δ **Enhance Your Lurability.** If you're a devotee of the sport of fishing, you might want to check out the Pro-Guide computerized lure selector offered by Basstronics of Midwest City, Oklahoma. Retailing for around five hundred dollars, the Pro-Guide is an easy-to-use self-contained unit that runs off batteries and is designed for easy mounting on a boat. The Pro-Guide program relies on the knowledge of Bill Dance and Roland Martin, veteran bass fishermen well known to the sport's enthusiasts. The user inputs information about the conditions at the site—such as temperature, water clarity, and time of day and season—and the program suggests the best color and size bait to use and how fast to reel in the line. Basstronics's Pro-Guide is available in sporting goods stores, tackle shops, and by mail order.

Δ **Software To Make Big Bucks.** The Yankee Group is predicting a boom in software sales during 1983. The Boston, Massachusetts-based marketing research and consulting firm is projecting home computer software sales of $810 million in 1983, up from $270 million in 1982. According to the Yankee Group, home computers generated revenues of $1.2 billion on sales of 2.4 million units in 1982. Projected figures for 1983 are sales of $2.5 billion on sales of over five million units. While the software market on the whole will see dramatic growth, game software for game computers will experience a shakeout, which the Yankee Group says is due to saturation of the market and increasing competition from home computers. The group goes on to predict that educational software is the next major home market. The group also identifies major trends in software development to be on the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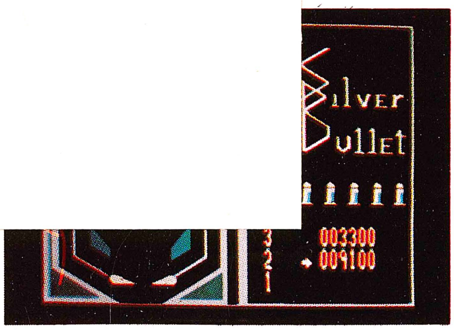

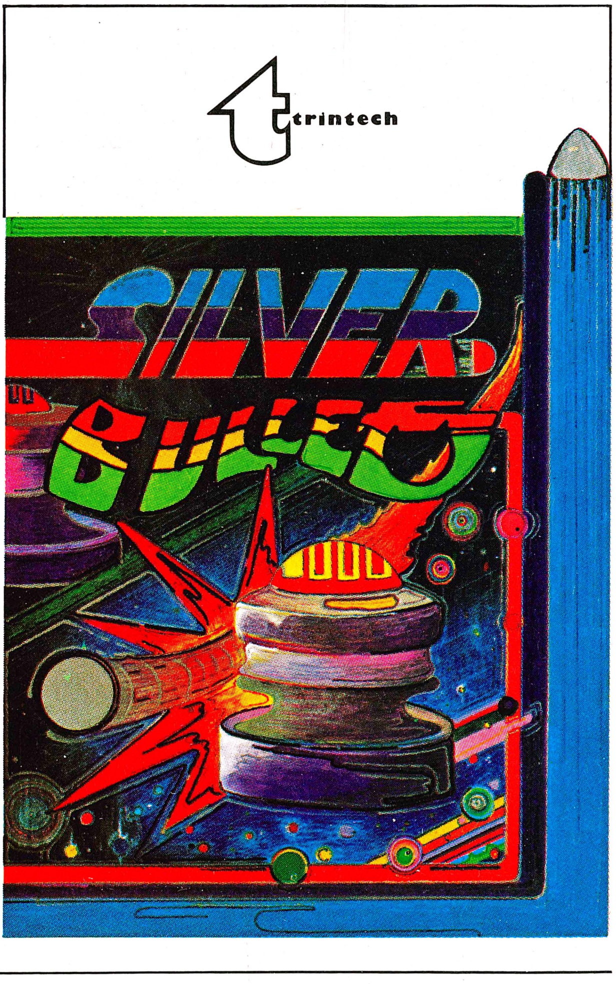

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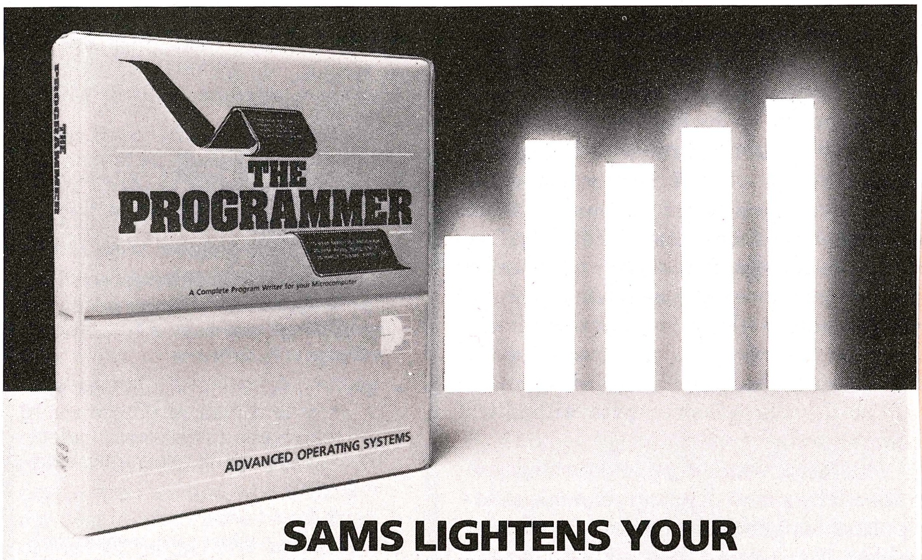
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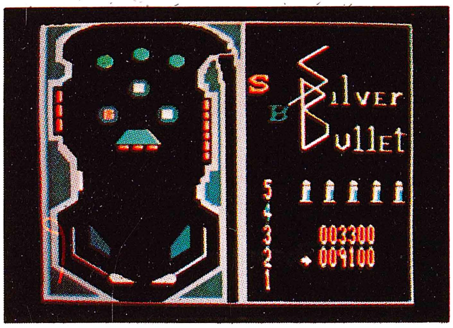

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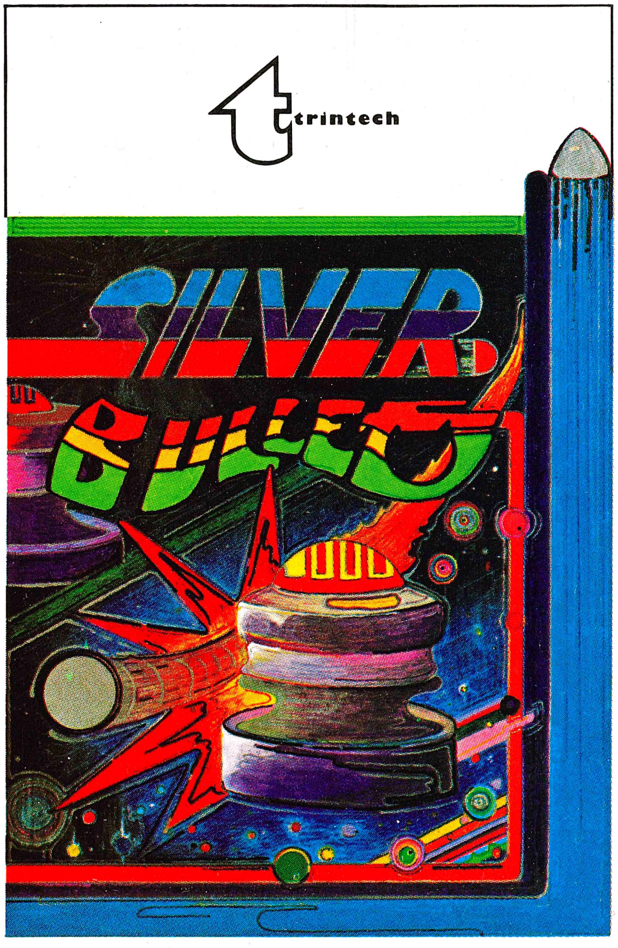

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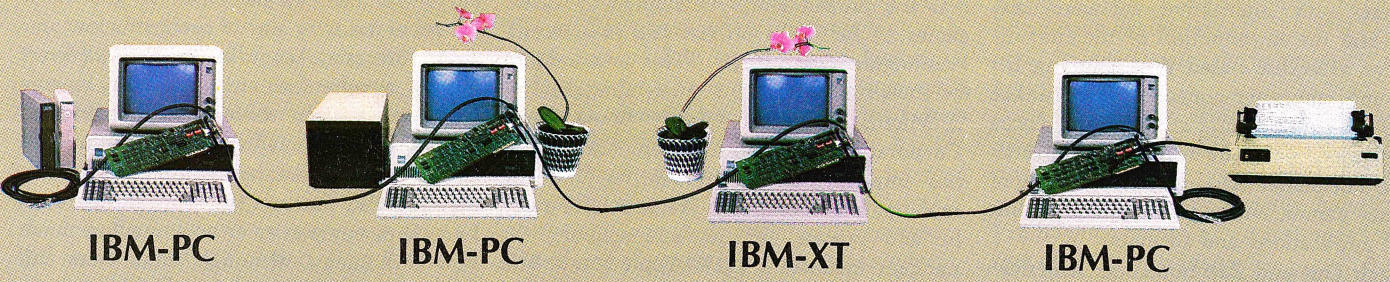

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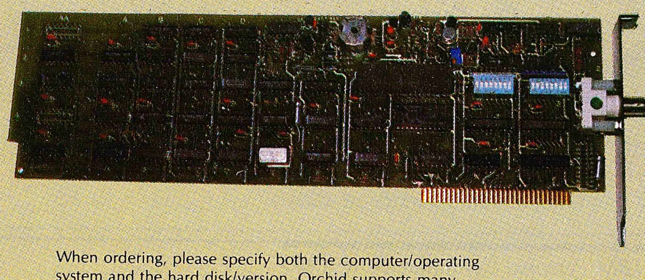

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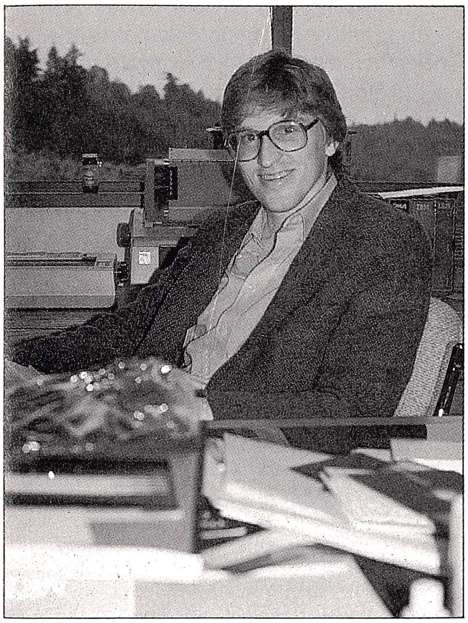
MICROSOFT'S MOUSE DRIVES A *MULTI-TOOL WORD*

by Kevin Goldstein



Microsoft's Jeff Raikes thinks the company's Multi-Tool Word *offers serious competition to dedicated word processors.*

The next generation of software for the pc has arrived and, if first impressions are any indication, the pc user is in for a real treat.

What with all the noise and hoopla lately over user-friendly interfaces employing mouse-driven pointers, it was only a matter of time before software incorporating these concepts began showing up for the pc. Well aware of the marketing advantages that accrue to the product that hits the market first, major software companies have been working ferociously to get their new lines of software out the door and onto dealers' shelves. With the introduction scheduled for July of its *Multi-Tool Word*, the first major word processor for the pc to use a mouse, it looks like Microsoft is a front-running contender to grab the gold ring.

Microsoft's new word processor is a powerful package that can more than hold its own against the competition, even without the mouse; indeed, the mouse is entirely optional, and anything that can be done with the mouse can also be done without it. As if to drive home that point, Microsoft is offering the program as part of a package deal with the mouse included at $475, or alone at a very aggressive price of $375. Considering the speed and convenience the mouse can offer, however (not to mention just plain fun), it's a good bet most of the sales will include the mouse. (The mouse is also available separately for $195.)

WordStar is often cited as the most powerful popular word processor for the pc. But *WordStar* was written in assembly language for the eight-bit 8080, and the version available for the pc is little more than a lightly modified eight-bit word processor. *Word*, on the other hand, is written in C (the high-level language that Unix is usually written in), and was designed from the outset to take advantage of all the resources of sixteen-bit machines.

Word's catalog of features starts with those available on *WordStar—Word*'s designer's clearly had one eye on what is selling in the current market—and then adds a list of its own features that can only be described as just this side of dazzling. A quick listing of the more impressive features would include rapid scroll; cut and paste via the mouse; eight-window capability; cut-and-paste between windows; attribute display onscreen (bold, underline, italics, strikethrough, super- and subscript, small caps); an *undo* command; up to sixty-four fonts; style sheets for rapid recall of predefined formats; a glossary for recall of text strings of arbitrary length; right-justified, centered, and right-aligned text; (when in color graphics mode, *Word* also runs on the IBM monochrome display); automatic leaders (fill

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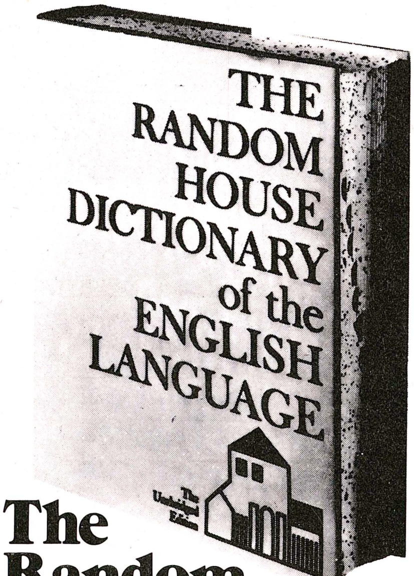

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characters); a dedicated footnote window; jump to page and jump to footnote; support for colored text, microspacing and proportional spacing; measurements in centimeters, points, picas, or inches; real-time automatic text formatting (no reform command). And that list isn't even complete.

One of *Word*'s best features looks so natural that the new user may not at first consciously realize just what is going on. What is going on is automatic and rapid smooth reformatting of the text. While the "what-you-see-is-what-you-get" style is commonplace by now, on most such programs what you get is liable to be the trash unless you make liberal use of the *reform* command. *Word*'s way around this annoyance is straightforward: It simply dispenses with the *reform* command. Insert new text and the old text shifts forward to accommodate; new line breaks are recalculated and displayed on the fly. Change the margins and the text obediently moves around to fit within the new margins. The automatic reform contributes significantly to overall ease of use.

Ease of use is the first battleground for new customers, and *Word* appears to have it all over the competition here. Replacing the difficult-to-learn and hard-to-execute multikey comands of *WordStar*, for example, is a simplified interface that will be familiar to users of Microsoft's *Multiplan* (the company intends to implement a similar interface style in all of its major application programs). To execute a command, use the mouse (or cursor keys) to point to one of the commands displayed in a three-line command window at the bottom of the screen. If the command requires additional instructions, these too can be selected by pointing at the options in the command window—no need to remember and type complex and finger-contorting command codes.

On the other hand, if you like typing complex and finger-contorting command codes, you can do that too: embedded within *Word* is an expert mode that lets the user dispense with the point-at-it command style altogether.

In day-to-day operations, it's probable that both styles will have their place. When one is originally creating text, long scrolling operations and distant cursor movements are seldom necessary, so it's likely that the mouse will not be used a lot during the writing phase. The editing phase is a different story, however: That's when the speed and flexibility of the mouse as a pointer to text becomes apparent. For example, in addition to simply using the mouse to reposition the cursor, you can use it to select portions of text. If the mouse is used to point at a character within a word, the left button selects the character, the right button selects the word, and both buttons select the whole sentence. It's also possible to select lines or paragraphs.

Marking a block is simplicity itself: Use the mouse to select the beginning word or character, then move the mouse in any direction to the end of the block. The impressive part about this operation is that selected text is shown as the mouse is being moved—you are, in a manner of speaking, marking the block interactively. Because the end point of the selected text can be located first (before the beginning point), Microsoft calls the specifying of the two end points *dropping an anchor* rather than marking the block beginning and ending. The interactive operation of moving the mouse from the first anchor to the second is called dragging.

And what can you do with a block once it's marked? Well, you can delete it—simply point to the scrap pile (that's a word in the command line, not an icon) and bang a mouse button. Make a mistake? Point at the *undo* command and bang again. You can even undo an undo.

The scrap pile is not a trash pile. One way to move text is to delete it *to* the scrap pile, then insert it at a new position *from* the scrap pile. To copy a block of text, simply copy it to the scrap pile and insert it at its new home. As with most operations, there's a quicker way available to the experienced user that by-passes the scrap pile: Select the text, point to the new location, and press the shift key and the mouse button.

An optional status window that displays various attributes of the text can be called up on the left side of any window; opening up the status window also allows some rather nifty additional operations with the mouse. To wit: When the mouse is moved to the left border of the status window, the pointer changes into a double arrow, which represents a scroll arrow. To scroll slowly, move the arrow to the top of the window and click the right button; to scroll quickly, move it to the bottom and click. What actually happens is that the line that the arrow is next to is brought to the top of the screen; positioning the pointer next to the bottom line will thus bring that line to the top.

A really neat little operation is available for long documents. Let's say you have a ninety-page document, and you want to go to the middle of it: position the scroll arrow halfway down the border and click both buttons. Need the thirtieth page? Move the arrow one-third of the way down and hit both buttons. Top border gets beginning of the document, and bottom border gets end of the document.

That last operation is called *thumbing*, and like so many of the other concepts you'll see in mouse-oriented software, it was adapted from the work done at Xerox Parc

(Palo Alto Research Center) for an innovative machine known as Alto (and Alto begat Xerox's Star, and Star in its time begat Apple's Lisa, and so on unto this day).

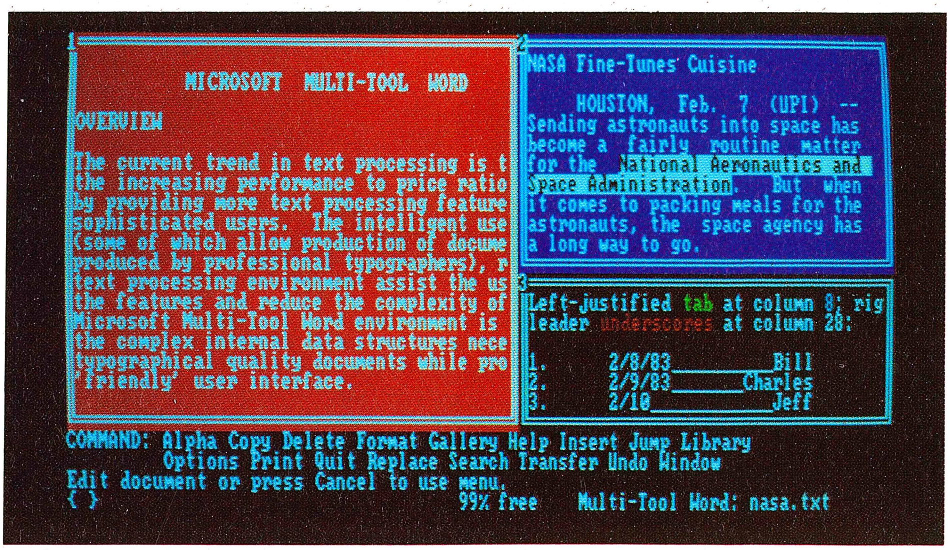
In addition to all those features that expedite moving around within a document (or between documents, if multiple windows are open), *Word* contains a number of features aimed at speeding up the entry of the document in the first place. One feature that looks like a front-runner for the "How did I live without it?" sweepstakes is the glossary: a file of user-specified abbreviations which, when keyed into the document, will be replaced by the user-defined text strings. Because the glossary is just a file, both the number of entries and the definition of each entry is limited only by available disk space. The legal profession will probably cotton to the glossary, since just a keystroke can insert entire legal documents. At the other extreme might be a glossary entry for, say, a single word that is always underlined. If you forget how you've defined a glossary string, you can scroll through the glossary in the command window, without leaving the current document.

Word also contains a very intelligent footnote window. If a reference to a footnote in the text is scrolled off the screen, the footnote scrolls out of the footnote window. Likewise, when a footnote reference scrolls onto the screen, the footnote follows suit in its own window.

Word's designers didn't skimp on the formatting capabilities. In addition to the standard font, up to sixty-four user-defined fonts can be loaded and accessed at any one time. Only the base font need be defined: italics, bold, small caps, and so on are all derived from the base font. Two options are available for displaying those attributes on the screen. In high-resolution-graphics mode, characters appear as they will actually be printed: underlined, italicized, boldfaced, and so on (combinations are also allowed). In the second mode, characters with different attributes appear in various colors—italics are in red, for example. The attributes are actually a property of the characters, which means that they move with the characters in a cut-and-paste operation (although that can be fairly easily overridden when the inserted text needs to take on the properties of the surrounding text). It also means there are no control characters that can be accidentally deleted or mismatched. The first version of *Word* will not show microspacing and proportionally spaced characters correctly on the screen; that feature is scheduled to appear in a later release, however.

Word's capabilities can give rise to a bewildering assortment of formats and styles, so a style sheet has been implemented that offers immediate access to predefined formats on a paragraph-by-paragraph basis. A sample format might read something like: left aligned, with a one-inch margin on the first line, and a 1.5-inch margin on all other lines (hanging indent), all characters in Helvetica. (The visible ruler is context-sensitive; it changes its display to reflect the margins of the paragraph the cursor is currently in.) A style sheet can even be created that will prevent widows and orphans. Styles are stored in style sheets; up to 128 styles may be stored per sheet. A style sheet is simply a file, and multiple files of styles are allowed.

Well, that's what *Word* can do. Now the question is, how *well* does it do it? Is *Word* really as good as it sounds? A follow-up article will provide a detailed review of Microsoft's innovative new word processor. ▲



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1
              MICROSOFT  MULTI-TOOL  WORD

OVERVIEW

The current trend in text processing is t
(the increasing performance to price ratio
by providing more text processing feature
sophisticated users.  The intelligent use
(some of which allow production of docume
produced by professional typographers), r
text processing environment assist the us
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Microsoft Multi-Tool Word environment is
the complex internal data structures nece
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'friendly' user interface.
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2
NASA Fine-Tunes Cuisine

     HOUSTON,  Feb.  7  (UPI)  --
Sending astronauts into space has
become a  fairly  routine  matter
for the  National Aeronautics and
Space Administration.   But  when
it comes to packing meals for the
astronauts, the  space agency has
a long way to go.
```

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3
Left-justified tab at column 8; rig
leader underscores at column 28:

1.      2/8/83__________Bill
2.      2/9/83_______Charles
3.      2/10____________Jeff
```

```
COMMAND: Alpha Copy Delete Format Gallery Help Insert Jump Library
         Options Print Quit Replace Search Transfer Undo Window
Edit document or press Cancel to use menu.
{ }                         99% free    Multi-Tool Word: nasa.txt
```

Word *can operate in either high-resolution text or color modes. In text mode, underline, bold, strike-through, and italics are displayed exactly as they will print. In color mode, special attributes appear as colored text.*

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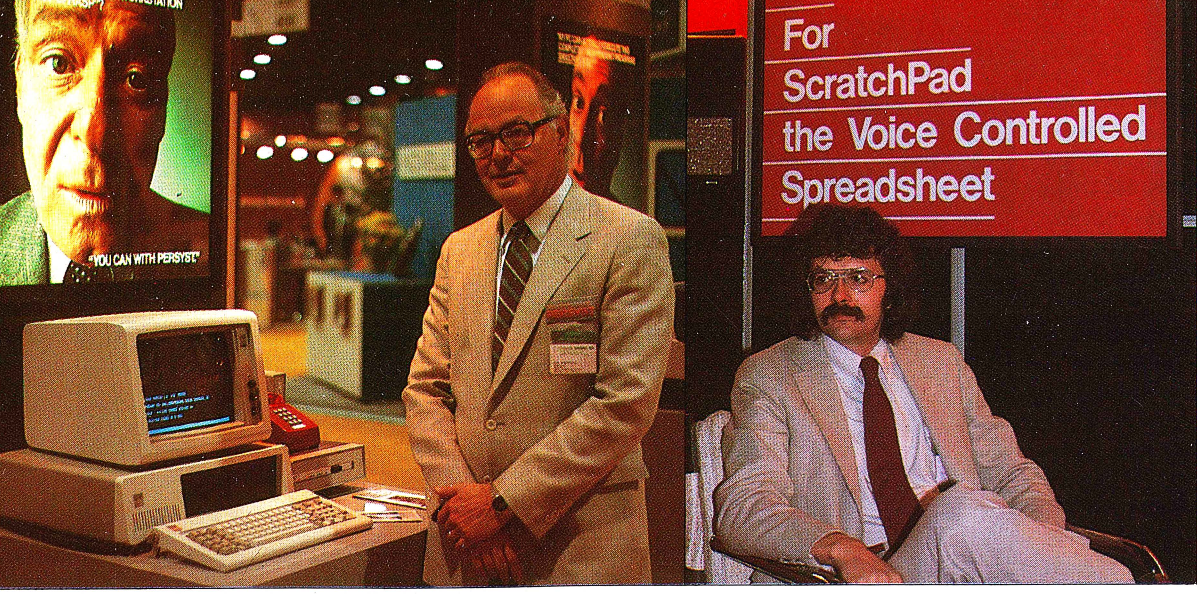

"YOU CAN WITH PERSYST."
For ScratchPad the Voice Controlled Spreadsheet

Donald E. McDonald, left, displays hardware from Persyst, while SuperSoft's Herbert Schildt demonstrates a voice-controlled spreadsheet program that uses a new voice-recognition card from Tecmar.

by John Socha

COMDEX

The Spring Harvest

GORILLA/BANANA PRINTER
GUARANTEED TOUGH · 50 CPS · UNIHAMMER MATRIX · TRACTOR FEED · 80 COLUMNS · 6 MONTH WARRANTY
DOT MATRIX PRINTER

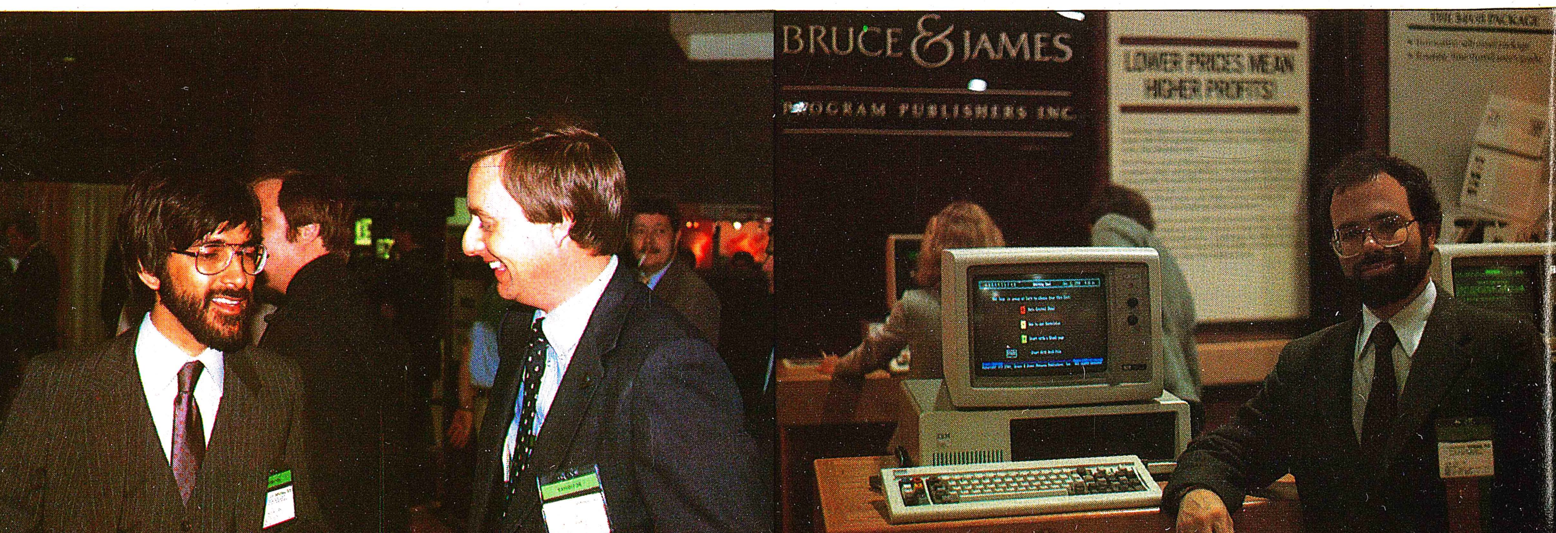
Above: Leading Edge Products brings you the Gorilla/Banana, a low-cost dot-matrix printer. Below, left: Safi Qureshey, of AST Research (left), and Leland Strange, of Quadram, exchange a friendly hello. Below, right: James Edlin demonstrates Bruce & James Software Publishers's Word Vision.

Despite no-shows from the big three—Microsoft, VisiCorp, and Digital Research—April's Spring Comdex show in Atlanta, Georgia, ushered in many new and interesting products.

Comdex is a trade show for any and all microcomputers. In the past it was dominated by Apple and S-100 machines; this spring (and last fall at Las Vegas), the show was more heavily populated by IBM Personal Computers and their look-alikes. Pcs, XTs, Compaqs, Columbias, Eagles, and Hyperions were everywhere. With them came new software and hardware add-ons.

What follows is a collage—a random sampling of new pc products introduced at this year's Spring Comdex.

Integration. In January of this year, Apple announced the Lisa computer, with its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"desk-top" environment; VisiCorp had sneaked in six weeks earlier (at the Fall Comdex) with its announcement of *VisiOn*. Like Lisa, *VisiOn* won't be delivered in quantity before summer. And, like Lisa, *VisiOn* will at first associate only with its own kin—meaning VisiCorp products; other packages to run in the *VisiOn* environment won't arrive until later.

Meanwhile, enter *DesQ*, from Quarterdeck Office Systems. This small start-up firm was formed in 1982, mainly from former employees of Citicorp's Axxa Corporation. The company began with four people; now there are eleven. Fortified with venture capital and adorned with a strong product, Quarterdeck looks like a formidable contender in the integrated-software marketplace.

DesQ, like Lisa's environment and like *VisiOn*, builds overlapping windows on the screen and can transfer information between different programs by means of cut-and-paste operations. But there's a difference: *DesQ* works with any commercial software running under DOS—on either the monochrome or the graphics display.

Quarterdeck works such magic with the help of its proprietary AI (artificial intelligence) language. New applications can be installed in *DesQ* with about five minutes of work. Then *DesQ* can do cut-and-paste by sending commands to each program. So, for example, *DesQ* cuts a section of a *SuperCalc*

"I found the printer to work beautifully out of the box."

John Ostrowski
Burke, Virginia

Plug and go compatibility is the name of the game. The new Transtar 130 letter-quality printer works right out of the box with the best-selling word processing packages. In just minutes, you and your **IBM PC** can quietly produce text with superscript, subscript, underscoring and a true boldface at 18 cps Shannon-text speed. Best of all, the Transtar 130 comes with a full six-month warranty and generates optimum print quality with ease for only **$895.**

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From Apples to Bananas, Spring Comdex in Atlanta, Georgia, bore fresh fruit—but no Peanuts or Popcorn.

spreadsheet by telling *SuperCalc* to save part of the spreadsheet into a disk file; then *DesQ* sends commands telling *WordStar* to read this file.

Judging by their demonstrations at Comdex, *DesQ* (which unfortunately won't be available until the end of this year) should prove to be a very fast and versatile package. Don't expect to use it unless you have a 5M hard disk and at least 256K of memory. Quarterdeck's demo used Talltree's *Jel* software—a sign that *DesQ* really will be compatible with most commercial software. The price is expected to be $395.

Voice Input. Tecmar introduced a voice-recognition card, which SuperSoft demonstrated with their *VoiceDrive* software (code-named Thunder) and with their spreadsheet program, *ScratchPad*. Visitors were treated to a demonstration by SuperSoft's president, Herbert Schildt:

"*Computer*," spoke Schildt in a normal voice.

"Commands:" responded *ScratchPad*.

"*Load. File. Year to Date.*"

"Okay," shot back *ScratchPad*.

The Tecmar card has a limit of one hundred words, and it must learn these words anew (and save its data to disk) for each person using the system. The vocabulary for each person uses a mere 6K of disk space.

Schildt said they've had a bit of trouble, because, "It's not clear how you talk to a computer." Darn things just don't seem to listen, do they? Schildt hopes that *VoiceDrive* will help executives with "keyboard shock" in learning how to use computers.

Communications Hardware. Modem cards for your pc are finally here. A number of companies introduced 1,200-baud modem cards, among them Hayes ($599), Rixon ($495), and AST. AST's card is packed. In addition to the 1200/300 baud modem, their card has a game port, an asynch port, a parallel printer port, and a clock/calendar with battery backup. All for $695 (or the modem alone for $595).

But Tecmar went a step farther, toward the land of science fiction: they introduced the electronic office. Using the Ethernet local area network, Tecmar's system routes voice messages as well as text to other pcs. The company has even found a way to boot a floppy-diskless pc with an Ethernet card. This no-floppy system is very quiet and faster than a floppy-based system. Of course, they had a pc with a hard disk across the room, and the no-floppy system booted from this disk. Tecmar's president, Martin Alpert, was telling fairgoers that the new Tecmar building (to be inaugurated soon in Cleveland) will have no telephones—just pcs with handsets attached.

More is in the wind: Zoom Telephonics, better known for their Silencer on-off switch for telephone bells (introduced in 1977), unveiled a 300-baud modem card for the Apple II—for only $119. There is talk of a pc version, and an under-$200, no-frills 1,200-baud card for the pc may come later.

Communications Software. SSM Microcomputer Products introduced their communications software, called *Transend*. Available at the end of August for about $189, *Transend* will provide electronic mail between pcs or through the Source. *Transend* is a what-you-see-is-what-you-get communications package. SSM uses the line-drawing characters on the IBM to build icons—pictures of such things as mailboxes, in-baskets, and so on. Sending mail is as simple as moving documents from a work basket to the out-basket. The program includes a simple full-screen editor for short documents, so there's no need to leave *Transend* to write short letters or memos. *Transend* will work with most auto-dial modems and can be configured to exchange information with most time-sharing systems.

The Apple-IBM Connection. So you didn't want to buy a pc because of all the Apple software? No problem. Thanks to Quadram's Quadlink you can now have an Apple inside your pc.

Quadlink turns your pc or XT into a 64K Apple II that uses the disk drives, display, printer, and any other peripherals of your IBM. The display and disk drives are attached directly to Quadlink, with cables running from there to the pc so that Quadlink can take control over any of these devices. This setup ensures almost complete Apple compatibility; the only Apple programs that won't run on Quadlink are those that use half-track copy-protection schemes (the IBM disk drives can't move by half steps).

In fact, because Quadlink is a separate board, it is possible to play an Apple arcade game using paddles and do word processing on the pc—both at the same time (provided you have two displays). Quadlink includes an Apple-compatible game port that can also be used for IBM games.

Because Quadlink includes an Apple-compatible disk controller, it is possible to transfer information directly between Apple and IBM disks—a feat not possible heretofore. It isn't clear at this time whether the transfer software will be included in Quadlink's $680 price.

Printers. Quadram's vice president for marketing, Leland Strange, stated that his company intends to become the leading manufacturer of pc-compatible add-ons. They're certainly headed in that direction. The rumor machine turned up a hint of a new, under-$1,000 ink-jet printer from Quadram (Quadjet?), and Strange confirmed the rumor. Details are scant, but expect it to have four colors and be very quiet.

Diablo introduced their own ink-jet printer for $1,295, dubbed the Series C. This seven-color printer is very quiet and produces vibrant, solid colors. Characters are very readable but are printed at only twenty per second. Still, if you want a good color printer, this one is worth your attention.

At the low end, Leading Edge Products introduced the Banana printer, first in the Gorilla line ("guaranteed tough"). This is a basic text-and-graphics printer, priced at about $250! The characters are not well formed (certainly not correspondence quality), nor are the graphics very dense (about sixty dots per inch), but the price is low and the Banana churns out characters at a reasonable fifty per second.

What with the rumors of peanuts and popcorn, this certainly seems to be the year of the munchies. What's next, the Grape?

Displays. There are now two companies offering full-screen displays for the pc. Micro Display Systems demonstrated the Genius, an eighty-character-by-fifty-seven-line CRT. They had white, green, and amber displays and were demonstrating *WordStar* and *Executive Secretary*.

And Quadram (those guys again) was showing the Quadscreen, which displays 160 characters per line by 64 lines and graphics with 960 dots across by 512 lines. Because of its $2,000 price, however, most pc users won't be that interested. On the other hand, the ever-reliable rumor machine was predicting the arrival of an under-$1,000 version of Quadscreen, one that will use a fifteen-inch display (Quadscreen Senior uses a seventeen-inch tube). With this display it will be possible to see two pages of seventy-nine characters by sixty-four lines—nice.

Portables. They're springing up like weeds, but most "portable" computers are too heavy to carry very far; in other words, they're transportable, not truly portable. Two companies are marketing truly portable, 8088/86-based computers.

The Compas Computer, from GRiD Systems, has been around awhile. It's a very small box with a full flat-screen display. But until now, the Compas Computer has used bubble memories for mass storage. At Comdex, GRiD introduced a portable floppy-disk drive and MS-DOS for its Compas. Although the floppy drive is slow, it's a step toward IBM compatibility. The Compas is not IBM-compatible, despite its use of MS-DOS, but future versions could be designed to be IBM-compatible.

What about a lap computer? Gavilan Computer Corporation introduced their nine-pound "mobile computer"—called the Gavilan. This is a full-power MS-DOS-based machine with an integral three-inch microfloppy and a sixty-six-character-by-eight-line display (small, but just plug in an external monitor and you have a full screen display). And it is a lap computer; it runs off internal batteries for eight hours and includes an AC adapter for recharging the batteries. It runs on either 110 or 220 volts, so you can use it in Europe as well. The Gavilan also includes a 300-baud modem and a touch-sensitive pad that acts as a mouse. What about a printer? There's a five-pound printer complete with its own battery pack that plugs onto the back of the Gavilan; it prints 60,000 characters per battery charge, on standard paper.

True, this is not a pc-compatible computer, but expect to see a compatible lap computer sometime soon. Price? Well, if you have to ask. . . .

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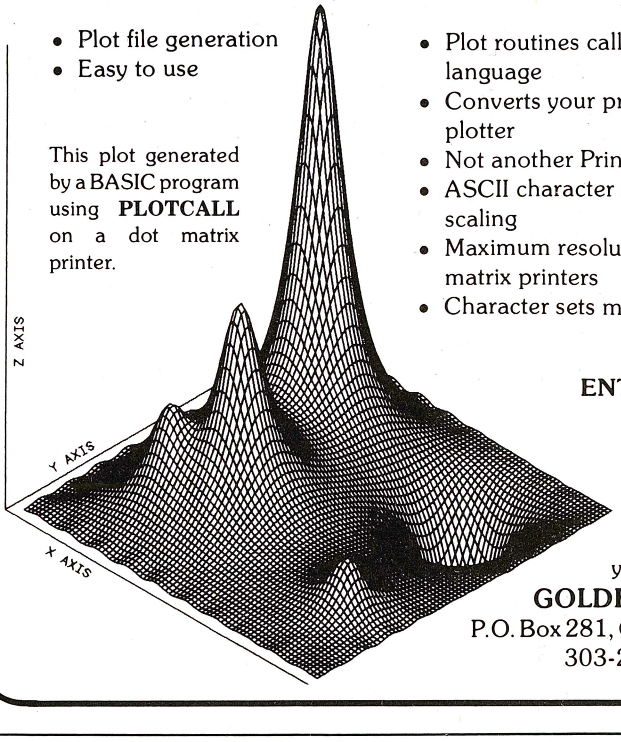

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Tate was there with *Friday!*, their new user-friendly, mass-market database system. You'll be hearing much more about *Friday!* as months go by: Ashton-Tate will be airing two radio commercials on stations throughout the country. These commercials are a bit silly, but very effective—don't underestimate those marketing guys. We seem to be seeing the beginnings of mass-market, full-function computers and software. It's only a matter of time before software manufacturers start television commercials, following in the footsteps of Apple and IBM.

Camilo Wilson, president of Lifetree Software, demonstrated the international version of *Volkswriter*, along with a sneak preview of some other new software. The latter will allow you to define your own character sets (Hebrew, for example) for both the screen (using the graphics adapter) and the printer (for many popular printers). This package will include a character-set editor and routines for the display and printer. It should be available some time this month for a price near $200.

Lotus demonstrated a version of *1-2-3* that uses the Hercules graphics board. The Hercules is an adapter that provides 700-by-300-dot graphics on the monochrome adapter; *1-2-3* looks real nice on it. The characters are much easier to read than the characters on the color/graphics display.

Softech Microsystems, purveyors of the UCSD p-System, were at the show selling their noble concept of portability. C. A. Irvine, vice president and director of engineering, described Softech's laudable goal of true software portability. You should, he says, be able to compile a program on a pc and take the disk to an Osborne I and run the program—no changes. Just think how nice it would be to have one disk of software that would run on all your different computers. To this end, Softech has rewritten the p-System. And Irvine readily admits that this new version (Version IV) is written primarily for system developers, not for users (forgetting, it seems, that programs are ultimately used by users).

Unfortunately, there are reports that the system isn't entirely as advertised. There is the matter of the "byte-sex" problem—which refers to the way in which bytes are ordered in memory. A floating-point constant uses four bytes of memory, and some computers store these high-order bytes first, while others do the opposite. These differences cause no problems with programs, but they do mess up data files—a major oversight.

Furthermore, the p-System is painfully slow on most machines (including the pc). Softech introduced a new, $50 run-time version of the system, but this may be too little too late for Softech to capture a share of the pc software market. Users still seem to prefer speed over portability; witness the popularity of *1-2-3* (written in machine language), as compared to that of *MBA* (written in p-System Pascal).

MicroPro introduced some new software, including a faster version of *WordStar*. They've also brought forth new, and apparently vastly improved, manuals. *StarIndex* is a package that adds automatic index and table of contents to *WordStar*, while *StarBurst* is a systems package that allows a nonprogrammer to link diverse software with a menu-driven system.

Unfortunately they're still holding the hard line on user support (or the lack of same). MicroPro president, Seymour Rubinstein, at a press conference said, "You don't take your car back to Detroit or even call them with questions; you take it to your dealer. That's where you get support. And it shouldn't be any different for any technological product. If you've purchased it through mail order or taken some other channel, you have chosen a precarious path."

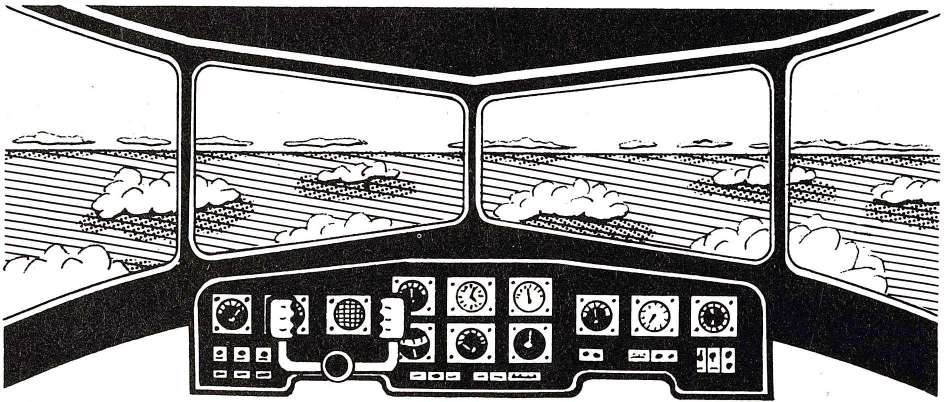
Perhaps it should be that way, but it isn't. Most computer stores know far less about product than car dealers know about theirs. And how many dealers does your town have who specialize in MicroPro products?

Lotus Development and many other software houses recognize the need for support, and it seems that even MicroPro may yet yield to pressure. Rubinstein went on to say, "I'm sure that in a relatively reasonable amount of time, we will have an end-user support division that will provide these services at appropriate fees."

Random Bits. The XT is here, but what about all of us who have an ordinary pc? Do we have to pay $3,390 for an XT/expansion chassis? Nope. Mountain Computer introduced an XT-compatible disk controller for $450 and a 5M hard disk for $995.

Mountain also showed a cartridge hard disk, but availability is uncertain; there are problems with the drives. It seems that Syquest, manufacturer of these drives, is having alignment troubles, such that a disk-cartridge written with one drive can't be read reliably by another drive. This should be corrected soon, and when it is, this cartridge hard-disk system should be very useful for portable computers. Price: about $1,300 for the drive.

Printer buffers are becoming more popular, since they free the computer for other tasks while the printer clatters away. Most printer buffers are similar in terms of features offered, but the Alien Group has introduced a new twist with theirs—the Sprinter. The Sprinter can display the buffer's contents on-screen, allowing you to scroll through the buffer and delete information at the beginning or end of the buffer. ▲



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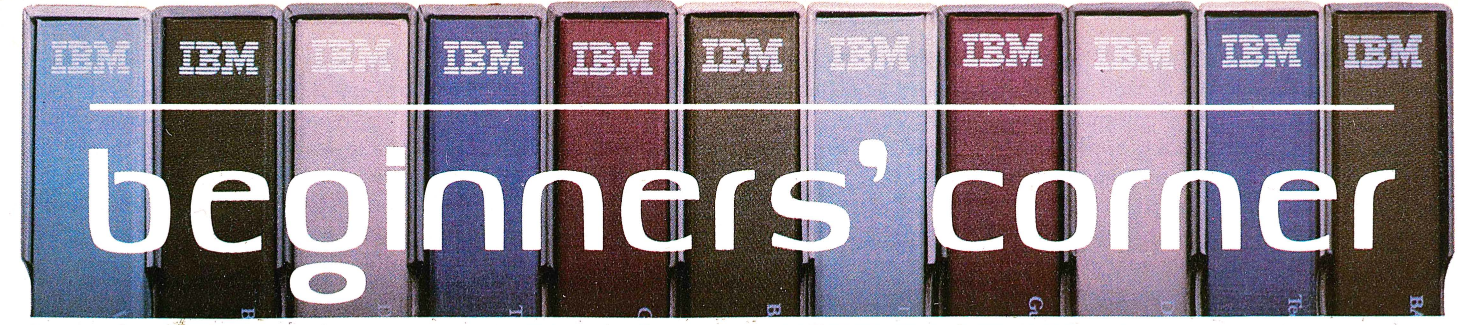


beginners' corner

by Craig Stinson

This month we'll continue our tour of the ASCII code by looking at the control characters—those usually invisible, sometimes peculiarly behaving characters that make up the lower thirty-two elements of the ASCII code. You know these characters as the ones you produce by holding down the control key and hitting some other key. But they come in other guises as well.

The enter key, for example, normally produces a control character, as do the escape key, the tab key, and the backspace key. A certain nonentity called a null is also a control character (actually a null is very much an entity; it only seems to be nothing because of its name).

The defining characteristic of a control character is that its ASCII value is between 0 and 31. All of these characters, except escape and null, can be produced at the keyboard with the help of the control key; certain of the more frequently used ones, as you'll remember from last month's discussion, have been given single-keystroke equivalents by the people who designed your system.

The usual function of a control character is to deliver an instruction, either to a piece of peripheral equipment, such as a printer or a video screen, or to a program.

Imagine for a moment that you're a program sending a document for printing to your local Epson FX-80. You've got to tell the Epson not only what letters to print but also when to start a new line, when to skip a line, when to jump to the top of a new page, and so on. If you want to use any of the Epson's nondefault print styles—its condensed or expanded modes, for example—you also have to issue some font commands at the appropriate times.

Control characters provide the means to mingle commands with data in a single stream of ASCII values.

Each hardware device is designed with its own command repertoire, and the commands are generally initiated by a control character. Many commands consist only of a control character; others include normal characters as well as control characters (the repertoire of many printers, for example, includes commands that consist of the escape character followed by some numbers or letters).

Unfortunately, each brand and model of peripheral is different from every other, so there isn't any common control language, even for devices that appear to have the same function. That's why it can sometimes be a harrowing experience to get started with a new piece of hardware, such as a printer. First you have to learn the command language of the hardware device, then (at least in some cases) you need to teach that command language to whatever application software you want to work in conjunction with the new hardware.

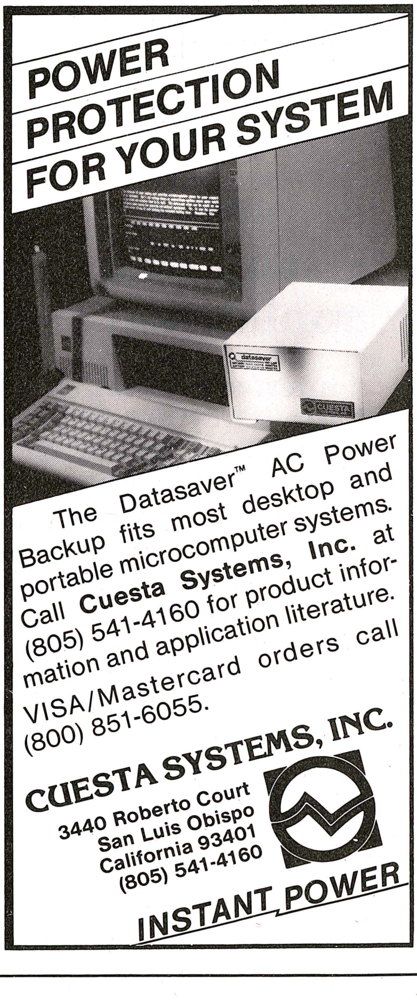
Good application programs (word processors, data managers, spreadsheets, or whatever) generally come with an installation routine that customizes the software for any of a variety of printers. If your printer is on the list, and if the install program works correctly, then the customization process should take place, as they say, transparently—which means you won't have to know anything about what's going on. But, of course, there's no way that software designers can anticipate every possible feature of every piece of hardware that ever may appear on the market, so compatibility problems still arise.

If you find that your application program isn't simpatico with one of your peripherals, you'll probably need to "patch" the program in some way. Start by contacting the dealer from whom you bought the software. If that person can't help you, an appeal to the software manufacturer will sometimes work (and sometimes it won't). User groups are an invaluable third source of assistance; see "User Group Update," in the May 1983 issue of this magazine, for a recent list of user groups.

Most of the incompatibility that exists between different brands of peripherals has to do with the more exotic features of the equipment. It's more likely, for example, that two printers will disagree about the codes they require to turn on their various fonts than they will about the codes used for positioning the print head on the page. That stands to reason; standardization is easiest to achieve on matters that all members of a class of peripherals have to attend to—such things as carriage returns and line feeds, in the case of printers.

Let's take a look at existing de facto standards for the use of control characters. Bear in mind that whatever your system does in response to input from you (or from a program) depends on the context in which that input occurs. The fact that a control-L sent to a printer will probably cause it to perform a form feed doesn't mean a thing about what will happen if you hit control-L while you're working in *1-2-3*. What we're looking at here is merely common usage among members of a couple of classes of peripherals (we'll concentrate on printers and video displays, the two most commonly used output peripherals).

Incidentally, this information is offered not for the sake of its immediate practical utility (you may never need to know any of



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this), but rather under the assumption that a little bit of background lore adds to one's culture and wisdom as a computer user; besides, the more you poke around with your machine and try to understand its behavior, the better equipped you'll be when it comes time to cope with that intractable application program and its manual in Swahili.

The most universally used and loved control character is control-M. In just about any context, control-M performs a carriage return. It'll do that for your printer, and it'll also do that on your video screen. You can even use it as a substitute for the enter key in most application programs; *WordStar*, *1-2-3*, and *VisiCalc* all accept control-M as a synonym for enter.

Closely related to control-M is control-J, which customarily performs a line feed.

Strictly speaking, the difference between a carriage return character and a line feed character is that the former moves the cursor or print head to column 1, leaving its vertical position unchanged, while the latter advances the cursor or print head one line without affecting its horizontal position. In practice the two characters are usually sent together. Your Basic interpreter, for example, seems to generate a carriage-return–line-feed pair, even if you ask for only one or the other character.

There is another difference between line feed and return that, from the perspective of a computer user (as opposed to a programmer) may be the one that really matters: A return is generally used to terminate some kind of input and send it off for processing; a line feed character, by itself, does not perform that function.

When you want to execute some command in DOS, you type its name at the keyboard; when you've finished typing the command, you issue a carriage return character, by hitting the enter key (you could also type a control-M). Until you hit the enter key the only visible processing going on is the "echoing" of your keystrokes on the screen. When you send that return character, your input is passed to the DOS command-line interpreter, which figures out what you want and responds appropriately.

The lack of standardization in the microcomputer industry about when carriage returns and line feeds are paired automatically and when they're not can be a source of confusion to computer users. You may, for example, occasionally run into an application program whose print routine asks you something like, "Do you want to suppress line feeds?" Or, "Do you want to add line feeds?"

If you find yourself faced with a question of that kind and you're not sure what answer is appropriate for your equipment, the remedy is simply to experiment. If you tell the application program to suppress line feeds and you get printouts all on a single line, you'll know what to do.

You're most likely to find that cryptic question posed by an older piece of software. Software designers are gradually learning to express their prompts and queries in plain English, instead of requiring you to understand the mechanics and/or logic of your hardware, so the trend today is for configuration routines to present you with a list of printer brands and models and let you merely point to the one that's yours. But it's good to be prepared for that exceptional case.

Just for practice, to see how the Basic interpreter handles these matters in conjunction with your printer, get into Basic and issue the following command:

```
LPRINT "TEST";CHR$(10);"TEST";
```

Odds are you'll see the word TEST printed twice at the left margin, with a blank line in between. Substitute *chr$(13)* for *chr$(10)* and see if you get the same results.

The *chr$( )* function is Basic's way of specifying a character by its ASCII number. *Chr$(10)* and *chr$(13)* stand for control-J and control-M respectively *(chr$(0)* is the null character, and the next twenty-six characters are control-A through control-Z, in alphabetic order). Notice that you have to use this roundabout notation to send a control character to your printer; if you typed *lprint "TEST";* and followed with a control-J, Basic would just move your cursor to the next line and wait for further input.

Control-H is a fairly universal symbol for backspace. You can probably make your printer put a slash through a zero, for example, by issuing the following from Basic:

```
LPRINT 0;CHR$(8);"/"
```

Control-H, in some contexts, will also do a backspace on the video screen. In Basic, for example, typing control-H is equivalent to hitting the backspace key; it moves the cursor back and erases the preceding character (this accomplishment, by the way, is sometimes called a destructive backspace, to distinguish it from a simple backward positioning of the cursor). On the other hand, control-H apparently means nothing to DOS.

There are a couple of other control characters that have fairly standard meanings for printers. Control-I is generally recognized as a tab command, and control-L will most likely cause your printer to execute a form feed (which means it will run the paper transport mechanism until it thinks it's at the top of your next page—assuming your printer uses continuous feed paper). Try these codes out on your CRT screen in DOS and Basic and see what they do.

Next month we'll burrow a little deeper into this subject. There are some other keystroke combinations that are not terribly well advertised in the IBM manuals and that may be useful to you in your dealings with DOS and Basic. ▲

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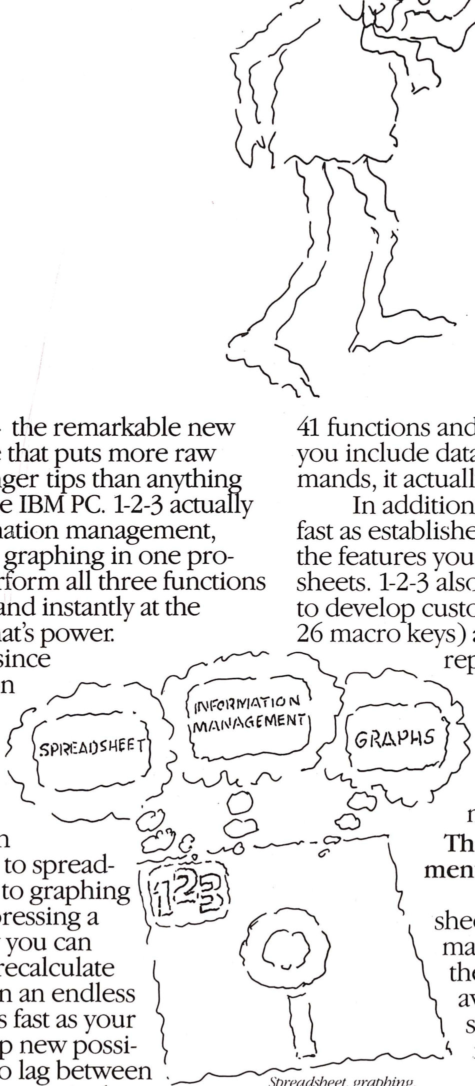

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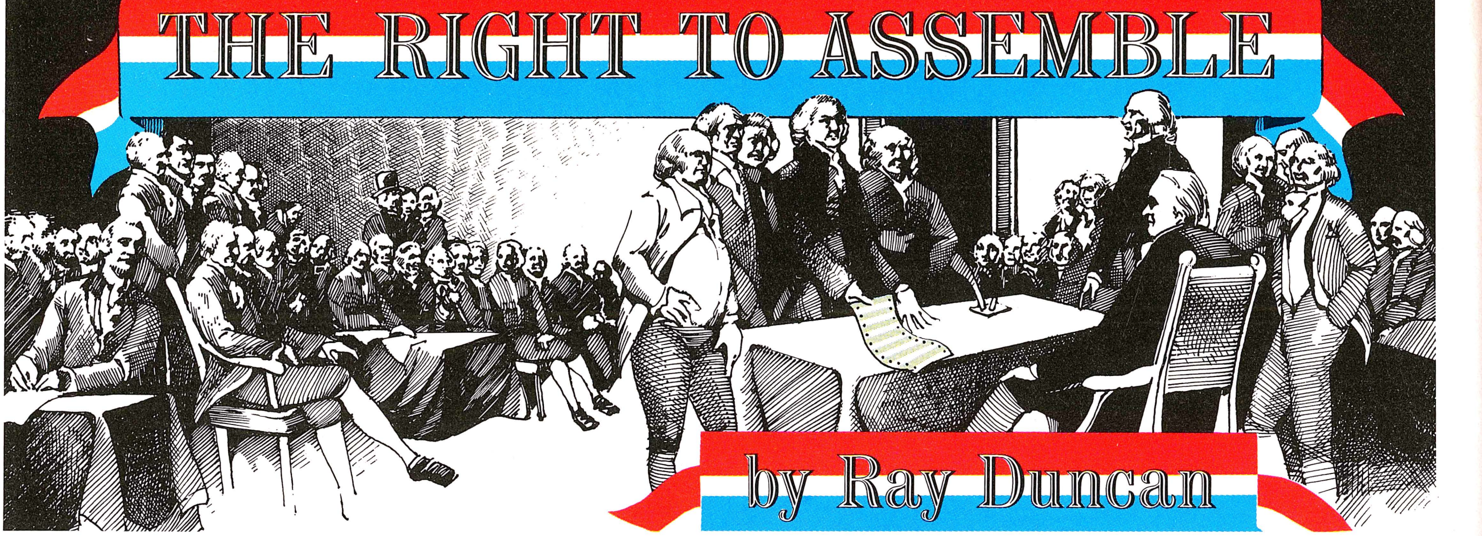

by Ray Duncan

In this installment, we'll review and expand the topic of memory addressing in assembly language programs for the IBM Personal Computer.

As we saw two months ago, the memory cells for the 8088 microprocessor have twenty-bit addresses, which means that approximately one million (actually 1,048,576) unique addresses can be specified. However, all of the 8088's internal registers (including those that are used to hold addresses) are only sixteen bits wide, meaning that the largest number these registers can hold is 65,535. How can these two facts be reconciled?

Address Generation. The twenty-bit address that designates a specific cell in physical memory is always formed from the consolidation of two other values. The first value is the contents of one of the segment registers, multiplied by sixteen (shifted left four bits); this is usually called the *segment* or *paragraph address*. The other component, called the *offset*, is obtained from the operand field of the currently executing instruction or from another register. The segment/offset pair is termed a *logical address*; because of the overlapping bits, many different logical addresses can result in the same physical address.

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The four segment registers built into the 8088 processor are referred to as the Code Segment (CS), Data Segment (DS), Extra Segment (ES), and Stack Segment (SS). Since each segment register gives access to a 64K area of memory, a program can only "reach" a total of 256K at any given time.

In order to save code space and speed address calculations, every type of CPU operation will use a certain one of the segment registers by default (although the default can be overridden in almost every case). For example, a *jump* or *branch* instruction always forms the memory address by means of the Code Segment register, references to variable data nearly always employ the Data Segment register, and items are pushed onto or popped from the stack via a Stack Pointer that's combined with the Stack Segment register.

As a simple demonstration, let us consider two similar assembly language instructions. Note that the mnemonic for the machine operation is written first, followed by a tab to the operand field. The operand is often made up of several parameters separated by commas; in the case of memory-reference instructions, the first part of the operand is called the *destination* and the second part the *source*.

Take as givens that the Code Segment register (CS) contains 0100H, the Data Segment register (DS) contains 0400H, and the BX register contains 0025H.

The instruction

```
MOV	AX,[BX]
```

means *move (load) the contents of the memory location whose address is in the register BX into the register AX.* Since we are accessing a *data* item, we form the physical address by shifting the contents of DS left four bits (which has the same effect as multiplying it by sixteen) and adding that value to the contents of BX; the result is the full address, 04025H. The contents of the two bytes starting at 04025H are then copied to the AX register.

On the other hand, the instruction

```
JMP     BX
```

means *perform a program jump to the location contained in the register BX.* Here, since we're dealing with program code rather than with data, the contents of CS are shifted left four bits and added to the contents of BX, yielding the address 01025H—which is loaded into the Instruction Pointer. Program execution will continue with the machine instructions stored beginning at 01025H.

It's probably becoming clear that as an assembly language programmer you must be conscious both of the contents of the segment registers and of the default register used by each instruction. Your program can look great on paper but be totally sabotaged if you forget to load a segment register, load it with the wrong value, or fail to perform a segment override at the proper time. Unfortunately, the error-reporting logic in the assembler will almost never flag these mistakes, because its concern is with syntax (how you say something) and not with semantics (what you mean by what you say).

The initial programming examples for this column will often circumvent segment-register issues by setting all four segment registers equal to the same value. The program code, variable data, and stacks will then reside in the same 64K memory area, and we won't need to worry about segment-register defaults and overrides. This method of programming is termed the "8080 model," because it's what you get when you translate code directly from the old eight-bit microprocessors. It doesn't allow you to exploit the full memory-addressing capabilities of the 8088, but it makes it much easier to learn the 8088's instruction set.

Addressing Terminology. Before going any farther, let's define some terms as they are commonly used in the Intel manuals and other 8086/88 programming textbooks.

Segment. This is a 64K chunk of memory whose base or bottom (numerically smallest) address is defined by the contents of a Segment Register shifted left four bits. For example, if the Code Segment register contains 2000H, it may be used in combination with a sixteen-bit offset to address any memory location in the range 20000H through 2FFFFH. This may lead to some ambiguity: the words "Code Segment" might mean the CS register itself, or it could mean the area of memory pointed to by the register. You usually have to rely on the context to figure out which meaning is appropriate.

Paragraph. The sixteen bytes of memory starting at the address defined by the contents of a segment register alone (not shifted left four bits). For example, if the Data Segment register contains 9000H, it defines a paragraph of sixteen bytes with the addresses 90000H through 9000FH.

Offset. The distance to some location from the base of a memory segment. This is always taken as an unsigned sixteen-bit integer in the range 0-65,535 (0000-FFFFH).

Displacement. A number that's added to the address of the current instruction to form a new address. This value must lie in the range −32,768 to 32,767 (8000H-7FFFH). Jumps, conditional branches, and subroutine call instructions are almost always coded with displacements rather than absolute addresses. Since displacements are relative, they permit pieces of program code to be moved around and executed from any base address in memory without modification—a process that's called dynamic relocation and which aids the operating system immensely.

Effective Address. Similar to the offset, this is an unsigned sixteen-bit number that gives the distance in bytes from the beginning of a memory segment. The processor calculates this value when it executes an instruction, in order to determine the location of the operand. An Effective Address (EA) may be the result of any combination of an eight- or sixteen-bit displacement, a base register, and an index register. The EA must still be merged with a segment register to form a full twenty-bit physical memory address; the segment register used depends on the identities of the base or index registers employed in the address calculation or on a previous segment-override instruction.

Addressing Modes. With these terms in hand, we can begin the subject of addressing modes, or ways that an instruction can specify the memory address of its operand. In general, there are four modes of addressing:

Immediate. The operand is encoded right into the machine instruction. We might say that the location of the operand is specified by the contents of the Instruction Pointer. For example, the instruction

```
MOV     AX,1
```

which means load the value 1 into the register AX, results in the following machine instruction:

```
B8
01
00
```

B8 is the opcode in this sequence; it tells the microprocessor that a sixteen-bit value should be loaded into the AX register from the location defined by the Instruction Pointer plus 1, then the Instruction Pointer should be incremented by 3.

Register. The operand of the instruction is taken directly from one of the general-purpose registers or one of the four segment registers. An example of this type of instruction would be:

```
MOV     AX,BX
```

which means copy the contents of register BX into the register AX.

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Direct Addressing. The instruction contains an absolute offset, which is combined with the contents of a segment register to form a physical address. For example, the instruction

```
MOV     AX,[9210H]
```

means load the contents of the memory location whose address is the sum of 9210H plus the contents of the Data Segment register shifted left four bits. It is encoded as the machine instruction:

```
A1
10
92
```

Direct addressing is a relatively inflexible addressing mode; the addresses are calculated and fixed at the time the program is written and assembled. Direct addressing is most commonly used to reference simple data variables and constants.

Indexed Addressing. The physical address is formed by an amalgamation of the contents of a register or registers and an optional displacement plus a segment register. This is an extremely powerful addressing mode, since it allows an address to be calculated when the program runs, rather than when it is written.

An example of indexed addressing would be:

```
MOV     AX,[SI]
```

which means move the contents of the memory cell whose Effective Address is in SI into the register AX. Note that the brackets around the name of the register SI indicate that it is being used for indexed addressing; it contains the address of the desired value rather than the value itself.

The most common use for indexed addressing is to extract values from tables or arrays. For instance, a program might ask the operator for the number of the current month and use that input to fetch the number of days in the month from a table, using the result to further validate the operator's entry of the date.

One of the more unpleasant features of the 8088 is that only some of the general-purpose registers (BX, BP, SI, and DI) can be used for indexed addressing, while others (AX, CX, and DX) cannot participate in address calculations at all. Furthermore, when you use two registers in combination to form an address, only certain pairs are legal. The default segment register for the indexed addressing mode depends on both the type of instruction and the identity of the base or index register.

When reading the Intel manuals or other reference books on the 8086 or 8088, you will find that the category called "Indexed addressing" may be broken down even further into some rather complex, confusing subcategories. Figure 1 (left) lists a sampling of the submodes with examples of their use.

Address Notation. Because of the segment/offset combination nature of 8088 addressing, when you are reading the 8088 manuals you may see addresses written in a number of different ways. An address with five hexadecimal digits, such as 0F425H, is an explicit twenty-bit address and refers to a unique physical memory location. An address with eight hexadecimal digits separated by a colon—for example, 0F00:0425—is a segment/offset pair; the segment is given first. To find the physical address, shift the segment left four bits and add it to the offset address; try it and you'll see that 0F00:0425 and 0F425H represent the same physical address.

Often you may wish to express an address relative to a segment register, without really caring where the segment is. This is handy especially when you are using the debugger provided with PC-DOS; Debug lets you specify an address as a segment register abbreviation followed by a colon and an offset—for example, CS:0425H.

Next month's column will include an overview of the IBM Macro Assembler commands, a discussion of assembly language style, and a simple subroutine to demonstrate the various machine instruction classes. ▲

Implied Memory Addressing	**MOV AX,[SI]**
Direct, Indexed Memory Addressing	**MOV AX,[SI+disp]**
Base Relative Addressing	**MOV AX,[BX]**
Base Relative Direct	**MOV AX,[BX+disp]**
Base Relative Indexed	**MOV AX,[BX+SI]**
Base Relative Direct Indexed	**MOV AX,[BX+SI+disp]**
Base Relative Stack	**MOV AX,[BP]**
Base Relative Indexed Stack	**MOV AX,[BP+SI]**
Base Relative Direct Indexed Stack	**MOV AX,[BP+SI+disp]**

Figure 1.

the 1dir

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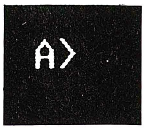
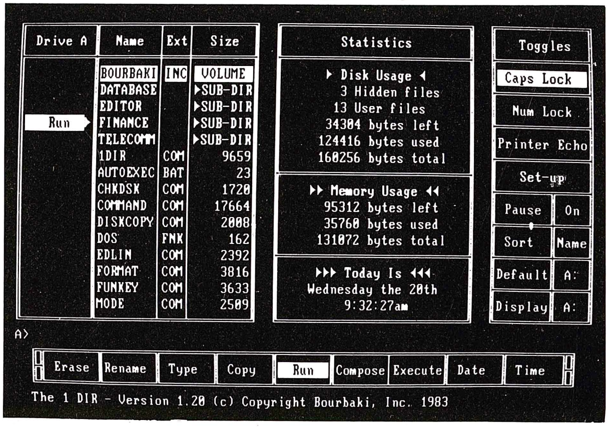
Which would you prefer?



```
A>
```

THIS ← or THIS →



```
Drive A | Name     |Ext| Size     |      Statistics       | Toggles
        |BOURBAKI  |INC| VOLUME   |    ▸ Disk Usage ◂     | Caps Lock
        |DATABASE  |   |▸SUB-DIR  |    3 Hidden files     | Num Lock
        |EDITOR    |   |▸SUB-DIR  |    13 User files      | Printer Echo
  Run ▸ |FINANCE   |   |▸SUB-DIR  |  34304 bytes left     | Set-up
        |TELECOMM  |   |▸SUB-DIR  | 124416 bytes used     | Pause   | On
        |1DIR      |COM|    9659  | 160256 bytes total    | Sort    | Name
        |AUTOEXEC  |BAT|      23  |                       | Default | A:
        |CHKDSK    |COM|    1720  |  ▸▸ Memory Usage ◂◂   | Display | A:
        |COMMAND   |COM|   17664  |   95312 bytes left    |
        |DISKCOPY  |COM|    2008  |   35760 bytes used    |
        |DOS       |FNK|     162  |  131072 bytes total   |
        |EDLIN     |COM|    2392  |                       |
        |FORMAT    |COM|    3816  |  ▸▸▸ Today Is ◂◂◂     |
        |FUNKEY    |COM|    3633  | Wednesday the 20th    |
        |MODE      |COM|    2509  |     9:32:27am         |
A>
 | Erase | Rename | Type | Copy | Run | Compose | Execute | Date | Time |
 The 1 DIR - Version 1.20 (c) Copyright Bourbaki, Inc. 1983
```

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To other software publishers Mitch Kapor's *1-2-3* must be taking on a resemblance to Ghidrah, the three-headed monster of Japanese filmlore who leaves chaos and destruction in his wake until chased off by Godzilla.

That's essentially what *1-2-3* is doing to the software market. Each month its lead over other spreadsheet contenders lengthens and its domination over the rest of the software market grows. *1-2-3* is becoming a behemoth of proportions not seen since *VisiCalc* was a pup. The only question left is whether a Godzilla lurks in the marketplace, readying to unseat Lotus's pride.

It certainly doesn't look as if any of the other spreadsheets can do the job. *MBA*, the closest thing to a true competitor of *1-2-3*, continues to hold its own, but still it slipped off the Top Thirty during the month of April. *SuperCalc* took a more serious dip, slipping from eighth to a tie for twenty-fifth and showing real weakness against the new guys—*1-2-3* and *Multiplan*. *VisiCalc* dipped to sixth and is also showing some vulnerability.

On the other hand, *Multiplan* is making up ground fast. In April it passed *VisiCalc*, and it appears to be still gaining marketing momentum. Be not deceived, however. Nothing about *Multiplan*'s performance gives any indication that it has the clout to gain significant ground on *1-2-3*.

The word-processing market also appears bereft of any program ready to vie with *1-2-3* for top honors. *WordStar* continues to be the word processor of choice by a wide margin. But its position appears tenuous.

Volkswriter and *EasyWriter II* continue in hot pursuit. *Easy Writer 1.1* appears to be a more erratic contender. But a new kid on the block, *WordPlus-PC*, is making headway. With the text processing market that fragmented, it seems clear that none will challenge *1-2-3*.

In the database market, *dBase II* is effortlessly gaining ground on its competitors. But there's nothing about its performance that indicates the strength to unseat *1-2-3*. *InfoStar* from MicroPro moved into the Top Thirty to join *PFS:File* and *TIM III* in pursuit. *VisiFile*, *EasyFiler*, and *Condor* currently are not finding sufficient adherents, although each has a sound base.

The communications market appears to be really fragmented, with users jumping from one program to another. In April, *Crosstalk* made a big jump to eighth after being off the list for a time. *Data Capture/pc* also regained the Top Thirty as *Asynchronous Support Package 2.0* took a nose-dive. *PC Modem*, *Smartcom*, and *PCTalk* are hovering in the background.

It may be that the entertainment market will provide the strongest competition to *1-2-3*. *Microsoft Flight Simulator* moved into second during the month of April and is showing no signs of slackening strength. It is selling at less than half the number of *1-2-3* at present, however, and seems to be near its peak.

Three newcomers to the Top Thirty didn't make a strong enough showing to indicate that they were Godzilla. FriendlySoft's *P.C. Arcade* got off to a good start, and it looks like May will be stronger. But stronger probably won't be enough. Its predecessor,

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P.C. Introductory Set, had its moments but never captured the top spot.

Suspended, from Infocom, also cracked the Top Thirty at eighteenth. Another fine text adventure from the folks who wrote the *Zork* series, it figures to stay around a long time without threatening the likes of *1-2-3.*

Finally, Sierra On-Line cracked the list with *Frogger.* This version isn't exactly comparable to Sega's original, but it figures to gain ground in May. The problem may be that it has so much ground to make up.

The novice experience level of many new IBM Personal Computer buyers is attested to by the strong showing of training programs. *Cdex Training for VisiCalc* almost cracked the top ten, while both *PC Tutor* and *The Instructor* jumped in the charts.

The market in April showed a slight upturn in software sales. The most frustrating facet for dealers was their inability to get hardware orders filled by IBM. Some accused the company of diverting shipments intended for dealers to their own national accounts salesmen. Others attributed the problem to a company as yet unaccustomed to the demands of a consumer marketplace.

Whatever the cause, it seems as though IBM is now jeopardizing its position as a leading supplier to the consumer market. As the clones enter in strength, IBM will need to be as efficient as Lotus to attain and maintain top position. So far, it isn't even close.

Lotus is doing everything right. There's not a Godzilla in sight. The IBM software market is theirs far more surely than the IBM hardware market belongs to IBM. ▲

IBM-franchised retail stores representing approximately 6.35 percent of all sales of IBM and IBM-related products volunteered to participate in the poll.

Respondents were contacted early in May to ascertain their sales for the month of April.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in May represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

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the top thirty

This Month	Last Month	Index	
1.	1.	248.36	**1-2-3,** Mitch Kapor and Jonathan Sachs; Lotus Development
2.	4.	116.13	**Microsoft Flight Simulator,** Bruce Artwick; Microsoft
3.	2.	98.35	**WordStar;** MicroPro
4.	5.	64.45	**dBase II,** Wayne Ratcliff; Ashton-Tate
5.	6.	55.56	**Multiplan,** Microsoft; IBM
6.	3.	46.12	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston; VisiCorp, IBM
7.	7.	44.45	**Home Accountant Plus,** Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
8.	—	28.89	**Crosstalk;** MicroStuf
9.	9.	27.23	**Volkswriter,** Camilo Wilson; Lifetree
	17.	27.23	**General Accounting,** John Moss and Ken Debower; IBM (BPI)
11.	—	25.56	**Cdex Training for VisiCalc,** Dr. Stephen C. Brandt; Cdex
12.	—	25.00	**FriendlyWare P.C. Arcade,** Michael D. Yaw, James J. Davis, Alan Vanchura, Jr., R. B. Roberts, and Anthony Chumak; FriendlySoft
13.	11.	22.78	**EasyWriter II,** Basic Software Group; Information Unlimited Software
	29.	22.78	**PC Tutor,** Lora Meise and Rick Lane; Comprehensive Software Support
15.	14.	21.67	**PFS:File,** John Page and D. D. Roberts; Software Publishing Corporation
16.	16.	19.45	**General Ledger,** George Shackelford; State of the Art
	29.	19.45	**The Instructor,** Jo-L Hendrickson; Individual Software
18.	—	17.78	**Suspended;** Infocom
19.	10.	16.11	**Asynchronous Communications Support 2.0;** IBM
20.	23.	14.45	**Deadline;** Infocom
21.	13.	13.89	**FriendlyWare P.C. Introductory Set,** Michael D. Yaw, James J. Davis, Frank Smith, Alan Vanchura, John Leatherwood, and Bruce W. Moore; FriendlySoft
22.	18.	13.34	**Zork I;** Infocom
	—	13.34	**TK!Solver;** Software Arts
	—	13.34	**Data Capture/pc,** David Hughes and George McClellan; Southeastern Software
25.	8.	12.78	**SuperCalc;** Sorcim
	15.	12.78	**PC Man,** Greg Kuperberg; Orion
27.	—	12.22	**WordPlus-PC,** Andres Escallon; Professional Software
	—	12.22	**InfoStar;** MicroPro
29.	25.	11.69	**TIM III;** Innovative Software
	—	11.69	**ProKey,** David K. Rose; RoseSoft
	—	11.69	**Frogger,** Olaf Lubeck; Sierra On-Line

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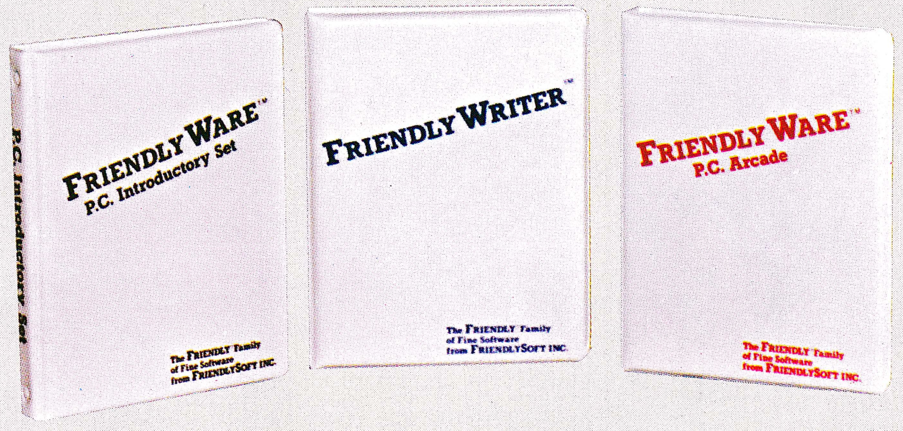
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